COAL AGE

Volume 15 New York, May 1, 1919 *Number* 18

All Price Revisions Will Be Upward

By R. Dawson Hall

BACK in 1900 there was an owner of a large lumber tract who said he wouldn't cut his timber so long as wages stayed so high. He could remember when men earned only 50c. a day and board, and he would "like to see the workingman who could earn legitimately more than a dollar a day." He's dead now, and the timber has been cut by more aggressive men. They made a big profit on the job despite the high wages, because prices were high as well as wages.

In considering whether wages are high or low it doesn't do to look back to Buchanan's day. We have had a Civil War since he was President. Nor should we worry about prices in 1913; there has been an even greater war since then. Prices are higher and wages are higher, but there is no need for bewilderment. All we have to do is to learn the value of the new dollar. We have in the readjustment period to readjust our thoughts and conceptions to a new sixty-cent standard. It is just as much a depreciated dollar as if some monarch had clipped away 40 per cent. of its substance after the manner of merry monarchs a few centuries ago.

"Prices and wages have gone up, and what goes up must again come down," people very simply but not very profoundly remark. As a boy we learned that the ball that went up sometimes stayed up and never came down. So the ball of prices beaten by the battledore of war has fallen on the roof of increased currency and lodged in the eaves trough of high wages. It can't be reached or brought down.

The war has lifted the cost of production and the selling price, but it not only caused these prices and wages, it also created conditions that will keep them fast—it built the unions which will not allow wages to fall; and it created a large volume of unnecessary currency that cannot be withdrawn or absorbed for years, if indeed it can ever be. The large quantities of this currency, like too many men on a job, get in their own way so that each "iron man" does less than a man's work.

Every one wants prosperity; we all know it cannot come without popular certainty that prices will go up, or at least sail along unchanged. Those, therefore, who are convinced that prices are, in the main at least, as low as they will ever be, should call meetings to convince the public of that fact. The principal need of the industry, of mine owner, manager and miner is prosperous business, everyday operation. Go to it now! Let every man know that you are confident that there will be no further wage or price clipping, but that if any change occurs it will be a higher wage or price, especially in those industries that have not shared hitherto in the prosperity arising from the war. Don't be a trailer, be a motor and pull. Establish your business, even if in doing so you help your neighbor as much as you do yourself.

IDEAS AND SUGGESTIONS

To Save Time in Laying Out Mine Curves

BY R. DAWSON HALL

In the United States, railroad curves are calculated in a manner that makes it possible to have simple angles of deflection for 100-ft. chords. The American method of laying out a curve is much simpler than the English method, because the angles of deflection can be added mentally. The method of describing the curve is easily understood and is just as expressive as the English method of stating the radius.

When running mine curves the engineer usually falls back on the English method, using a definite radius of so many feet or tens of feet, letting the deflection angle be what it may. He does this because he thinks he cannot use the regular deflection table, as it is calculated for the 100-ft. chord, which cannot be used where the radius runs between 20 ft. and 200 ft. The chord would in many cases be longer than the diameter.

To make the procedure still in general use plain it may be said that it is usual to take the formula:

$$\frac{\frac{1}{2}\ chord}{radius} = sin\ \frac{1}{2}\ deflection\ angle$$

and assume the exact chord and the exact radius desired and calculate the deflection angle. This is all very well, but it is not advisable to accept that angle when it is found. It may run 9 deg. 45.3762 min., and if there are many chords to run the addition of them would make one dizzy. The better way is to say the deflection angle should be 10 deg., not 9 deg. 45.3762 min., and then take the table which the transitman will find in Searles, Trautwine, Nagle or other fieldbooks, and from that table make his calculations, remembering that the radius of a circle having any given deflection angle per chord is proportional to the length of the chord.

The same is true of the middle ordinates and tangential offsets. Let me compare the radii, midordinates and offsets for a 6-deg. standard curve laid off with 100-ft. chords and a 6-deg. miniature curve laid off with 10-ft., 20-ft. and 20-m. chords respectively:

Chord	Degree of Curve	Radius	Middle Ordinate	Tangential Offset
100 ft.	6	955.37 ft.	1.31 ft.	5.234 ft.
10 ft.	6	95.54 ft.	0.13 ft.	0.52 ft.
20 ft.	6	191.07 ft.	0.26 ft.	1.05 ft.
20 m.	6	191.07 m.	0.26 m.	1.05 m.

It will be seen that when the chord is one-tenth as long as is the chord on which the table is based the radius, the midordinate and the tangential offset are each one-tenth as long. The standard table is almost as readily used as if it were calculated for the laying out of a miniature curve.

As a 20-ft. chord makes a convenient length for mine work Frederick MacCoy, a mining engineer of Jerome, Ariz., has calculated a table for laying out curves which appeared in the *Engineering and Mining Journal*. It is a compromise between the English and American systems. The radius has been assumed to be as in the second column, and the deflection angle corresponding to that radius has been calculated. All the fractions of minutes in the deflection have been ignored or the nearest even minute has been taken and the results, thus mutilated or modified, are shown in the first column. Mr. MacCoy has recalculated the radius from the deflection in the first column and set that radius down in the third column as the "actual radius." It will be seen that it closely approximates the radius as recorded in the second column.

In laying out timbers, tipple bents and other work involving chords of unusual length, the better plan is to refer to the railroad tables, divide the figures given for the radius, midordinate and tangential offset by 100, and multiply by the chord chosen. The deflection angle, or "angle" of the curve, will then of course be based on the chord of unusual length which conditions have made necessary or desirable.

TABLE OF STANDARD CURVES FOR MINE TRAMROADS
(For Chords of 20 Feet)

Degree of Curve	Nominal Radius	Actual Radius	Log. Radius	Defl. in Minutes Per Foot
58° 00′	20 ft.	19.97 ft.	1.300370	87
46 00	25	25.08	399315	69
38 24	30	29.98	476855	57.60
32 52	35	34.99	543887	49.30
28 44	40	39.99	601905	43.10
25 32	45	44.97	652944	38.30
22 56	50	50.05	1.699410	34.40
19 08	60	59.96	777867	28.70
16 22	70	70.07	845562	24.55
15 18	75	74.95	874784	22.95
14 20	80	80.00	903089	21.50
12 44	90	90.04	954434	19.10
11 28	100	100.10	2.000440	17.20
10 26	110	109.98	041330	15.65
9 34	120	119.92	078897	14.35
9 10	125	125.14	097404	13.75
8 50	130	129.85	113458	13.25
8 12	140	139.87	145709	12.30
7 38	150	150.23	2.176760	11.45
7 10	160	160.00	204119	10.75
6 44	170	170.28	231172	10.10
6 32	175	175.49	244253	9.80
6 22	180	180.08	255464	9.55
6 02	190	190.02	278796	9.05
5 44	200	199.95	2.300927	8.60
5 28	210	209.70	321595	8.20
5 12	220	220.44	343298	7.80
5 06	225	224.76	351726	7.65
5 00	230	229.26	360320	7.50
4 46	240	240.47	381063	7.15
4 36	250	249.18	2.396511	6.90
4 24	260	260.50	415807	6.60
4 14	270	270.75	432569	6.35
4 06	280	279.55	446461	6.15
3 56	290	291.39	464477	5.90
3 48	300	301.61	479449	5.70

Note: Curves of less than 100-ft. radius should be laid out by half chords.

As Mr. MacCoy points out, a similar adaptation of tables of switch curves may be made to fit any gage of track by the use of the following rules: For the same gage the radii of the turnout are to one another as the square of the number of the frog. For the same frog with different gages, the radii and frog distances are to each other as the width of gage. For a standard unit, a No. 1 frog requires a turnout radius of 2 ft. on a 1-ft. gage. The same frog on a 3-ft. gage requires a turnout radius three times as long, or 6 ft. A No. 6 frog on a 1-ft. gage needs 6 × 6 times as long a turnout radius as a No. 1 frog on a 1-ft. gage—that is, 6 × 6 × 2, or 72 ft. Changing the gage to 3 ft. the turnout radius will be three times as long, or 216 ft. Similarly a No. 6 frog with a 1-m. gage requires a turnout radius of 72 meters.

Remodeling a Poorly Designed Switchboard

BY J. J. NOLAN
Linton, Ind.

Figs. 1 and 2 show a side and a front view of a three-panel switchboard which was erected some few years ago by a construction company at a certain Indiana mine without taking into consideration facilities or room on the rear of the board for repairing or renewing parts, the need for which the numerous con-

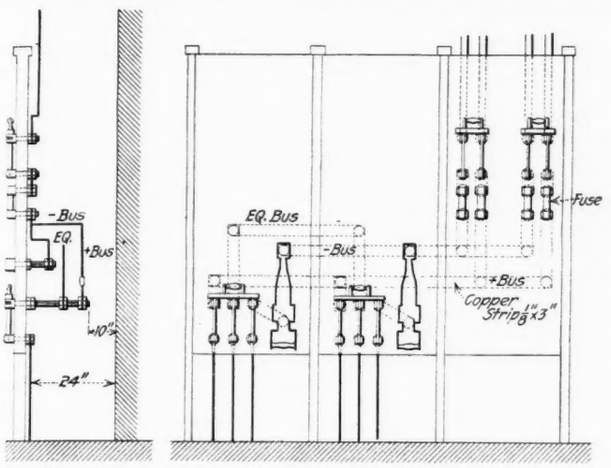


Fig. 1 Fig. 2

FIGS. 1 AND 2. SIDE AND FRONT VIEW OF THREE-PANEL BOARD

nections shown should have made evident unless all joints were designed properly and pulled up snug.

Trouble began later with hot connections in numerous places on the rear of the board. The limited room of 10 in. between the positive bus and the wall made it difficult to make permanent repairs, especially as the gas in the mine required the booster fans to be operated

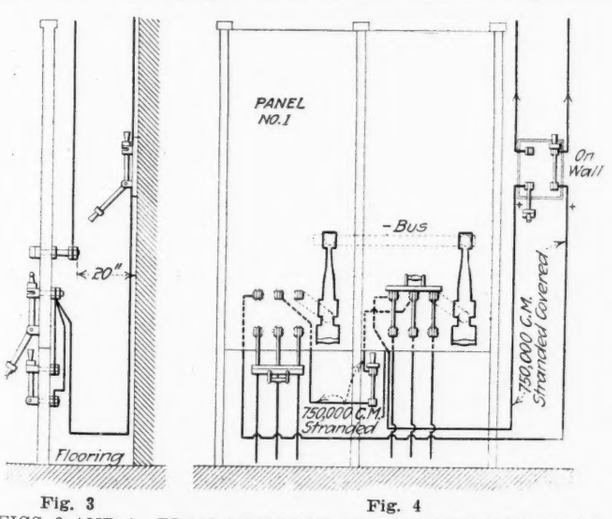


Fig. 3 Fig. 4

FIGS. 3 AND 4. PLAN OF BOARD AND SYSTEM OF WIRING

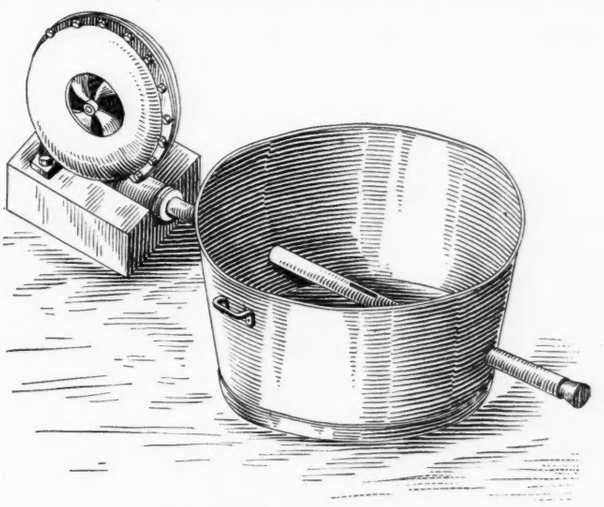
continuously day and night. Furthermore, as may be seen, the whole length of the three panels was charged on the rear whether one or two generators were running.

Figs. 3 and 4 show a plan of the board and wiring which I designed and later adopted to do away with one panel altogether as well as to reduce the number of connections on the rear of the board from 42 to 19. This increased the clearance between wall and bus from 10 to 20 in. and permitted the disconnection of the positive from either side as desired. The new arrangement makes for safety and allows plenty of room for the removal or repair of almost any part without entailing a shutdown.

The two single-pole knife switches on the wall and the one single-pole switch connecting the equalizers are left closed only when there is occasion to repair or remove some part of one panel. Fig. 4 shows No. 1 panel when cut out, also the equalizer and left-hand single-pole switch on the wall when repairs are to be made on this side.

A Prospector's Washtub Forge

A handy forge frame is made out of an old galvanized-iron washtub. A 2-in. pipe, with a slot ¼ x 2 in. cut in the upper side, is placed horizontally, as shown, and connected with the bellows or blower. The other end of the pipe is plugged with a piece of wood. The tub is then filled to the level of the pipe with dirt or ashes, and the rest of the way with coal. If the pipe gets stopped up, the wood plug can be drawn, and the



INGENIOUS FORGE MADE OF OLD WASHTUB

fine coke and ashes blown out. This washtub forge is much more simple for the prospector to put together than one constructed of lumber or rocks, and is fireproof. Furthermore, lumber is not always obtainable "forty miles from nowhere." The tub is wide enough to support conveniently the usual lengths of steel used in such work. If long pieces of hand steel are to be sharpened, a bent-rod support is easily attached to the tub. When the prospector moves, the tub is not necessarily an inconvenience, for it can be used as a packing case.

THE IMPERATIVE NEED for thorough lubrication and protection of wire ropes on slopes and shafts is pointed out by S. Hardesty in a paper on "Stresses in Wire Rope" in the "Proceedings" of the American Society of Mechanical Engineers. The lubricant chosen should be one which will penetrate to the inside of the rope and thoroughly saturate the hemp core. A heavy dressing which merely forms a coating on the outside of the rope may be worse than useless, for it may give a false sense of security while the inside of the rope is devoid of lubricant and possibly even rusting. If slippage of the strands and wires can take place, as in well lubricated ropes, then when a rope is bent around a sheave of proper diameter the stresses will be negligible.

Underground Coal-Loading Machinery*

By E. N. Zern
Pittsburgh, Penn.

SYNOPSIS—*Many types of coal-loading machines have been introduced in American mines. These vary from shaking chutes to elaborate and ponderous devices that both mine the coal and deposit it in a car. None has been received with universal favor, although most of the devices have achieved a fair degree of success. It is manifestly unfair to put any coal-loading machine to work unless mining, haulage and other conditions are made favorable to its operation.*

THE coal industry has ever been beset with problems, some evanescent, because the solution has been comparatively easy, and some recurring with such persistent regularity that it may be inferred they have never been solved. In this latter classification falls the labor problem, which is now doubtless the biggest problem confronting the industry.

In the past the perplexities which have arisen from an unsatisfactory labor situation have never brought disaster to the industry, but, instead, have benefited it to some degree. The labor situation, in a sense, has been responsible for almost every improvement in mining from the laying of the first pair of mine rails down to the adoption of the modern coal-cutting machine. During our seven centuries of mining experience, necessity has unfailingly mothered invention. Coal production is now but little more than a series of mechanical processes.

The mine, which we are now pleased to call modern, uses machinery to do the undercutting, electric or air-driven drills to bore the holes, explosives to bring down the coal and locomotives to haul it away. A few clever devices on the tipple or breaker assist gravity in the work of preparation. The missing link in the chain of mechanical operations is the device which will replace or simplify hand loading. The advantages of underground devices for the loading of coal may be stated as:

1. The output of coal per employee can be increased, or, in other words, fewer men will be required for a stated output. Present figures of production are so low that they should be easy of betterment.

2. The development area of the mine can be greatly reduced. With the use of machines it should be possible to get the same amount of coal from an area one-half to one-fourth as great as with present practice. The benefits to be derived from a restricted area are: (a) Less capital will be tied up; (b) ventilation will be cheapened and simplified; (c) haulage systems can be better organized—trips can be moved rapidly and with less delay; (d) trackwork, timbering, etc., being concentrated, can be done to better advantage; (e) fewer mine cars will be needed; (f) supervision will be more effective; (g) power costs will be reduced and (h) the safety of employees can be better guarded.

3. The roof can be kept in better and safer condition, owing to the rapid rate of advance of rooms and entries and the subsequent drawing of the pillars. Where combination mining and loading machines are used, the integrity of the roof is particularly well guarded, inasmuch as no explosive is employed.

4. Thin beds can be worked profitably. The number of mines now opened in seams from 3 to 5 ft. thick is surprisingly large. It is well understood that the problem of haulage and loading is particularly troublesome in low beds, and it may reasonably be expected that such mines will early embrace the help of machinery.

5. The summation of all advantages indicate that the cost of producing coal can be reduced.

The several devices here shown do not include all that have been brought forth during the past decade. Omission of several has been made necessary because they are at the present time undergoing reconstruction, and the feeling existed on the part of the maker that to show the experimental machine might prove an injustice to the future model. However, a sufficient number are here depicted to indicate the various principles underlying the construction and operation of past and present devices.

Mechanical conveyors, perhaps, should not be included as a type of coal-loading machine, inasmuch as they require that coal be shoveled into them. For the purpose of this paper, however, the term "coal-loading" is used with a liberality that will permit the inclusion of conveyors, the principle of which is found in most of the so-called "loaders."

The first coal-face conveyor used in the United States was the joint invention of Clarence Claghorn and W. C. Blackett. It was installed at Vintondale, Penn., and although it has already been described, a brief reference to it as a type will not be out of place.

The coal worked at Vintondale is the "B", or Lower Kittanning, bed, 42 in. in thickness, with a dip of 8 per cent. and an average cover of 200 ft. At one time there were two different arrangements, one using a single-conveyor system and the other using a triple conveyor.

The method of working with the single conveyor is as follows: The main entries are driven up the pitch through the center of the property and cross headings

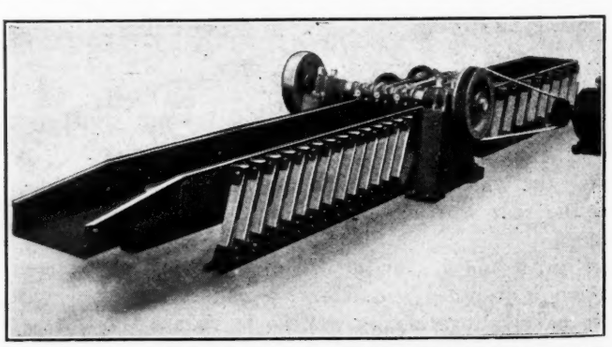


FIG. 1. BALANCED TYPE OF DODGE-ZIMMER CONVEYOR, SHOWING CHUTES AND SUPPORTS

*Abstract of paper presented before the annual meeting of the Coal Mining Institute of America, Pittsburgh, Penn., Dec. 5, 1918.

are turned from these every 400 ft. Block headings are driven perpendicularly off the cross-entries on 265-ft. centers, this allowing a solid face of 250 ft. These block headings are driven 15 ft. wide, but bottom is lifted only 7 ft. wide near the rib, and of such depth as to allow a clearance of 6 ft. from the top of rail. The length of the block heading is 350 ft., and the one nearest the outcrop is first attacked. The time required in removing equipment from one block to another is usually about 15 hours, the change, of course, being made when each block is worked out.

The conveyor consists of a trough or pan, made of sheet steel ⅛ in. thick, 12 in. wide at the bottom, 18 in. wide at the top and 6 in. high. The conveyor, which is 250 ft. in length, is made up in 6-, 12-, 15 and 18-ft. sections, connected together by means of ½-in. flat-headed bolts, countersunk. The conveyor chain is made of either steel or malleable cast iron, held together by bolts and so designed that repairs can be quickly made.

The number of men required to run a block with the single conveyor is 13, consisting of the block boss, machine runner and helper, driller (who also acts as shot-firer), engine boy, head man and six loaders. With a 5-

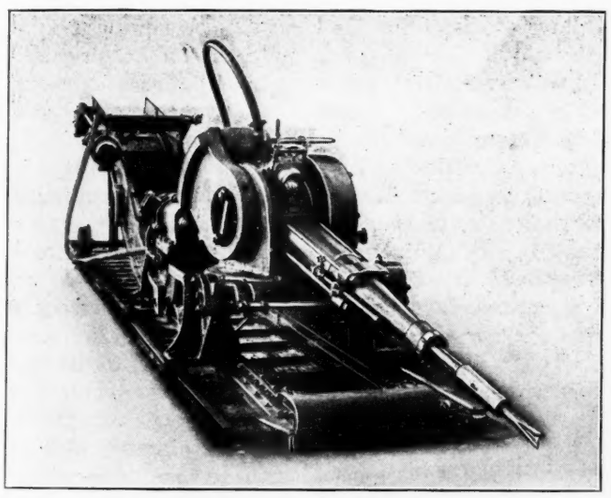


FIG. 2. INGERSOLL-RAND MACHINE READY FOR WORK

ft. undercut a block throws 125 tons of coal. Four cuts per week are, on an average, obtained from each block, making a daily average of 100 tons per conveyor.

The triple-conveyor system has been found an improvement on the single conveyor as it means less cost for development and for deadwork in mining the block. When the block is ready for operation, a conveyor 350 ft. long is placed on the block heading. Extending to either side is a conveyor 250 ft. long, with delivery ends directly over the main conveyor, one being 5 ft. in advance of the other. Each conveyor is driven by a 20-hp. motor, incased in a sheet-iron frame mounted on steel shoes, so as to be easily moved.

When a block is cleaned up, the timbermen move up the conveyor, set the break rows, pull the timber and make everything ready for the conveyor to start when the opposite block is loaded out. The main conveyor, which is made up of 12-ft. sections, is disjointed about every third day, and one of the sections taken out and moved to the block heading next to be worked.

The method of handling the cars to the conveyor is simple. A side track is laid 300 ft. long, of which the

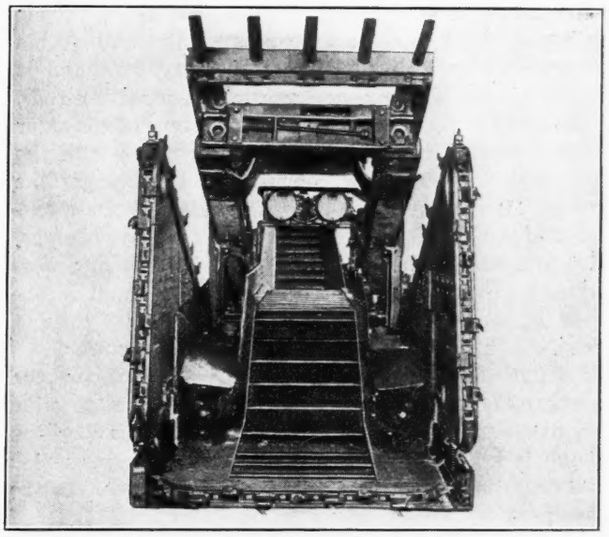


FIG. 3. FRONT VIEW OF JEFFREY-MORGAN MINING AND LOADING MACHINE

block heading is the center. Connection is made with the main track at the lower end and a crossover switch is placed directly under the conveyor. At the upper end of the siding is placed an electric hoist. A trip of 14 cars is shoved into the empty track, the rope is attached and the trip pulled up to the conveyor. As each car is loaded the trip is pulled forward. When loaded, the trip is dropped on the loaded siding, the rope disengaged and attached to the empties.

The working of the face is similar to that of the single block, and the output averages 150 tons per day. An account of this operation, given in 1907, stated that the cost averages for two years showed that block coal was loaded on the cars 35 per cent. cheaper than the district mining rate, and that this cost could be reduced when contemplated improvements were added.

Other forms of conveyors in use for transporting coal from the face to the main haulways are:

Belt Conveyors—These consist of an endless belt made of various materials and operated in the same manner as the chain-and-trough conveyor just described. In construction they are similar to the appliances used for conveying coal to bunkers in power houses or for bringing coal from a slope opening to the tipple. Where used in England[1] they are commonly built in lengths of 300 ft., although in some instances the conveyor attains a length of 600 ft. The belt usually runs at a speed of 50 ft. per minute and delivers from 20 to 25 tons per hour. The saving at one mine is reported as 10c. per ton in the cost of delivering the coal to the shaft bottom.

Shaking Conveyors—In the United States the only conveyor, I believe, which uses this principle is known as the Dodge-Zimmer conveyor and is made by the Dodge Manufacturing Co. One driving mechanism is employed, this being located either at the end or at the center of the conveyor. When located at the center it is known as the "balanced type," and when at the end as the "unbalanced type." In operation the conveyor has a short backward and forward motion, with a slight rise on the forward stroke which moves the material forward in the trough in a smoothly flowing stream and without transporting any of the mechanical parts.

[1]Sydney F. Walker, in *Coal Age*, Vol. 10, p. 744.

The conveyor consists of a steel trough of proper depth and width for the transport of the coal. This is supported by inclined laminated spring legs, and is attached to the driving mechanism by connecting-rods.

The great advantage claimed for this type of conveyor is the absence of working parts, as compared with the chain and flight type of conveyor. In operation the only part that moves on a wearing surface is the eccentric shaft in the driving mechanism; expenses of operation and maintenance are low because of the few moving parts; the power required to operate is small, a conveyor 12 in. wide and 65 ft. long conveying 7 tons of coal per hour, requiring but one brake-horsepower.

Moving Trough Conveyor—In this conveyor the trough moves along the coal face and delivers to mine cars at a central point. The movement of the working trough is accomplished by the aid of wire ropes coiled on a drum located at the central delivery point. In the Thompson apparatus there is one rope, the ends of which are secured to the ends of the moving trough, the middle of the rope being carried around friction drums or pulleys. The trough itself is moved from end to end of the face by a motion of the rope over the friction drum. The action is similar to that of an endless rope except that the trough is looped into the rope. In the Bridgewater conveyor the main-and-tail rope system is employed.

Any type of conveyor, so arranged as to be parallel with the face and advancing with it, offers the following advantages: It can be made low, some conveyors being only 6 in. above the floor; the distance through which the coal must be raised by the loader is small, hence he can load more coal with less muscular effort; it is unnecessary to rip the roof or take up bottom; it requires no track from the haulways to the face; coal can be shoveled with less fatigue since the conveyor is right at the loader's back; the conveyor can be readily worked in various lengths and made to follow the face throughout the working of the panel; it requires little power to operate, varying from 5 to 10 hp.; it increases the tonnage output per employee at a decreased cost.

Combination Mining and Loading Machines

The combination in one machine of a coal-cutting unit and a coal-loading unit represents an ideal, long in the minds of inventors. Such a machine combines the functions of the coal cutter, the auger for boring holes, the shotfirer, the explosive and the hand loader. In scope, then, the adoption of this principle to the winning of coal is about the biggest thing that has ever been projected in the history of the art. The displacement of explosives is one of the strong points in favor of this type, and when first brought out the statement that it eliminated explosives attracted attention.

The Ingersoll-Rand cutter and loader will be readily understood by all mining men as its main parts consist of a powerful air-driven puncher, mounted on a carriage over a conveyor. A lever is used to elevate or depress the puncher pick, a second lever moves it from rib to rib through the agency of a small air engine, while a third lever moves the whole puncher, together with its truck, bodily toward or away from the face, the conveyor remaining stationary within certain limits, or accompanying the forward or backward motion of the puncher, as desired.

The puncher itself makes about 160 strokes per minute and is controlled in the same manner as the ordinary hand-operated machine, going from rib to rib and making a cut extending the entire width of the entry. The conveyor is driven by a separate engine suitably controlled by a stop valve. The mine car is filled evenly by moving it about three times during the loading process.

Making the undercut is the longest part of the operation, requiring from 25 to 40 min., according to the

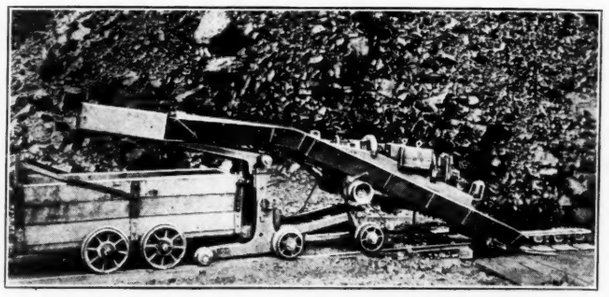


FIG. 4. SIDE VIEW OF FLAT FLIGHT JEFFREY LOADER

hardness of the coal. The knocking-down process ordinarily takes place faster than cars can be supplied. When it is completed the conveyor is pulled back about 7 ft., a section of track is laid, and the conveyor again moved forward into position.

Two set-ups during the shift constitute a 10-ft. advance of the entry. It is estimated that under suitable operating conditions, such as high coal of the quality found in the Pittsburgh bed, the machine should average 250 ft. of advance per month of 25 working days, working day shift only, night shift being reserved for the laying of tracks, piping, etc. Where conditions have been suitable and cars have been served to the machine without delay, as much as 20 ft. of advance has been made in a single shift. The average advance in entries of the Annabelle mine at Worthington, W. Va., where several of these machines have been in operation since 1913, is somewhat over 10 ft. The cuts average 10½ to 11 ft. wide and 6½ ft. high.

In 1913 the Jeffrey Manufacturing Co. built a number of machines based on the patents of E. C. Morgan. The principal elements in this design are the undercutting chain, the two shearing chains, the heavy reciprocating pick that knocks down the coal and the conveyors that carry it back and load it into a car. Fig. 3 shows a front view of the machine, which operates on the same principle as a breast machine, the first, or sumping cut, being made at either rib, usually the left. It is fed forward in a stationary pan, making a cut 5 ft. wide, 7 ft. deep and of a height to suit the seam. The machine has an undercutting chain with cutter head similar to that of a breast machine, and a shearing chain on either side. The frames carrying these shearing chains can be varied for different heights of coal.

Between the shearing chains is mounted a frame carrying a number of heavy punching picks. This frame is readily raised and lowered by the operator, who can cause the picks to strike at any height he desires. The coal falls onto a conveyor which is made thin enough to go into the kerf cut by the undercutting chain. This conveyor carries the coal to the rear end

of the machine and dumps it into a second conveyor, which is mounted so that it can swing at any desired angle to the machine.

After a cut is made, the machine is moved sideways by means of a rope hitched to a jack at the opposite rib, and then another cut is made. When slate is to be piled up at the side of the room, the rear conveyor is swung sideways, the slate rolled onto the front of the machine and gobbed by the two conveyors.

In a test run the machine required an average of 13½ min. to make a cut and about 3 min. to move the machine to the next cut, or about 16 to 17 min. time for each cut. The coal loaded averaged 21 tons per hour, although where roof conditions were good the machine has loaded 30 tons an hour. The height of the coal is 5 ft. 8 in. In another district an average of 60 tons per day was had for three months. In the driving of an 11-ft. entry it has averaged 20 ft. advance per shift of 8 hours under rather unfavorable circumstances. Figures show a saving of 32c. per ton by using the machine for entry driving. The crew for each machine consists of a machine runner, a helper and a driver. If the slate is heavy it may require an extra man for its handling.

In spite of the attractiveness of the combination mining and loading machines as labor-saving devices, they have so far failed to gain a prominent place in the sun. One trouble with them would appear to lie in the large number of working parts. In the next place, a combination type of machine is necessarily cumbersome and is moved with difficulty from place to place, even though such movement is not often required. Again, in spite of the care taken in design, failures due to breakage of vital parts are sure to occur.

Combination shoveling and loading machines as a type consist of a shovel or similar device, to pick up the coal after it has been shot down, and another device, as a belt, to convey it to the mine car. It therefore occupies a position midway between the combination mining and loading type of machine and the plain conveyor.

The Hamilton machine will be the first treated of this type, for the reason that it was one of the pioneers in its line. The Hamilton loader, in its original design, consisted of two conveyors, the rear one serving for

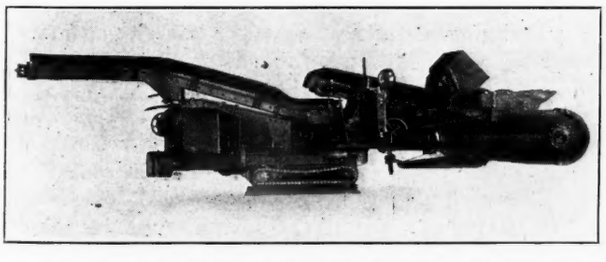


FIG. 5. MYERS-WHALEY SHOVELING MACHINE

gathering the coal and moving it to the front conveyor, which carried it to the car and also served as a picking table. The front conveyor was permanently mounted on a truck; the rear one, when necessary to move the machine to another location, was mounted on pony trucks. The entire machine was self-propelling and on reaching the face the rear, or gathering, conveyor was jacked up and the pony trucks removed, permitting the nose end of the conveyor to rest on the floor.

A novel feature of the first machine was that after the flights passed around the sheave wheel they folded up and entered the return guide pressed back against the chain, the advantage claimed being compactness, and that this prevented pushing the lumps off the car as it was being filled. In the later design this feature was discarded, the flights remaining stationary with respect to the chain.

The operation of this improved type is as follows: The coal being undercut and shot down, the loader is run to the working face of the room, after which the

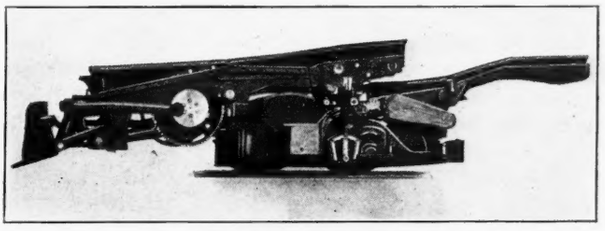


FIG. 6. VIEW OF HALBY SHOVELING MACHINE

pony truck is removed and the gathering conveyor let down upon the mine floor. Adjustable mine posts are set, one at either side of the room, as near to the mass of coal as possible. The ends of the feed chain are then slipped into hooks located at the bottom end of the posts, the feed motor is started, and the nose of the conveyor, which lies flat on the pavement, is swung to one side of the room.

The pit car being placed in position under the picking table, the machine motor is then started, moving the flights in the proper direction to gather coal. The machine is then moved forward by its own power into the pile, making a hole at one side of the room 3 or 4 ft. deep.

The machine is now ready for its movement across the room, which is effected by winding on the feed chain attached to the second post. As the radial sweep travels in its arc across the mine floor, the flights pick up and carry away all of the material lying in its path. The machine will gather lumps of coal as large as will pass between the roof and the top of the car.

After one sweep across the room, the machine is again advanced into the pile, the direction of the conveyor chain reversed, and the operation of the first cut repeated, with the coal going up the trough on the other side. The travel of the conveyor is 80 ft. per minute, and when the trough, which is 12 in. wide, fills 6 in. deep with coal, the machine is loading 2000 lb. per minute.

A haulage reel on the machine carries a cable which is placed around a sheave and serves to pull the loaded cars from the loader to the roomneck. When cars are unusually large, double reels may be used and operated on the main-and-tail rope system, handling both loads and empties to and from the machine. The time required in moving the machine from place to place and setting up is stated as not exceeding 20 to 30 minutes.

In 1909 a machine was designed and built by the Jeffrey Manufacturing Co. under certain patents owned by the Hamilton interests. It has flat flights without any obstruction. These flights slip under the coal in the same manner as a shovel and pick up the coal without any difficulty and with little hand shoveling necessary. In the driving mechanism for the conveyor is a

friction clutch that works very satisfactorily. If the conveyor happened to be forced against the rib, for instance, or the flights encountered any obstruction, the conveyor would simply stop, thus protecting the machine from breakage. The conveyor is pivoted over the car. The loader is pulled into the coal pile by means of ropes leading out from either side of the conveyor.

The Hamilton machine, in its original and improved forms, was experimented with for two to three years in various coal fields. It loaded coal at the rate of a ton a minute. It picked up the coal and left the floor practically clean. It would load extra large lumps, was easily handled and fairly free from breakdowns. To all appearances a machine had been produced which possessed every requirement, and was capable of loading at a rate equivalent to the work of ten men. But in spite of its good features it did not prove to be a success, largely because existing conditions in coal mines rendered it impossible to keep the machine in continuous operation.

The Myers-Whaley machine is mounted upon a main frame, supported by four flanged wheels running on the main track. A jib section is pivoted upon the front end of the main frame, so that it can swing laterally 45 deg. each way. This jib section carries the shovel and the front conveyor which receives the material from the shovel. Also pivoted at the same point on the main frame is a rear conveyor frame which is adjustable laterally, and the conveyor which receives material from the front conveyor and discharges it into a mine car. The seat for the operator is mounted on the jib section in such position that he can see in front of the shovel and direct its operations. The swinging of the jib laterally enables the machine to reach 10 ft. to each side from the center of the track, or a total width of 20 ft.

The shovel is entirely automatic in its action, and is a unique piece of mechanism consisting of a shovel member 34 in. wide, having an auxiliary, or rear section, fitted into it. The shovel is actuated and supported by a crank which rotates continuously, and which is driven by heavy roller chains on each side of the machine. The rear end of the shovel is carried by a cross shaft having rollers on its ends which run in cam grooves, so as to give the mouth of the shovel a motion similar to that of a shovel actuated by hand. The front part of the shovel discharges into the rear section, which has auxiliary cam rollers engaging in another cam groove and which turns the rear section partly over during each stroke. In this way the material is picked up and transferred to the belt conveyor. This crank rotates at a speed of 12 to 13 times per minute.

The No. 2 machine, the smallest model, has a height of 46 in., length 19 to 21 ft., width 4 ft. 9 in., net weight 9000 lb., and requires a mine height of 54 in. The No. 4 machine, the largest model, has a height of 54 in., a length of 22 to 26 ft., weighs 18,000 lb., and requires a mine height of 72 in. The largest machine is capable of loading coal at an average rate of one or more tons per minute, and is driven by a 20-hp. motor.

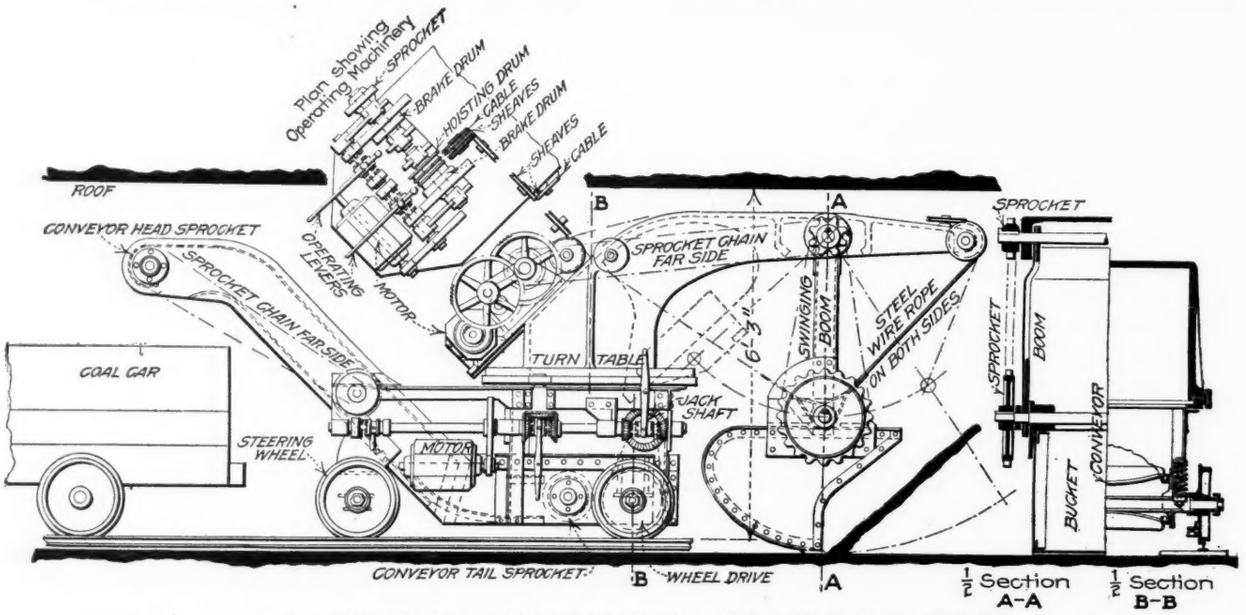


FIG. 7. SIDE VIEW AND PART SECTION OF DILLIG LOADING MACHINE

It will be evident that the room-and-track system employed is susceptible to variation and should be worked out at each mine in order to secure the best results. The swinging of the rear conveyor laterally enables the machine to load cars upon the track directly behind or upon a track closely parallel to the machine track.

The Halby machine is furnished in two standard coal models. The T-600 machine is designed for use in mines which permit of 6½ ft. or better headroom. This model is used where such headroom is available because of the fact that it permits of a high car under the rear conveyor. Its weight is 20,000 lb. The T-700 machine is designed especially for 5-ft. coal and may be used where there is a height of 5 ft. 6 in. from floor to roof. In this latter model the rear conveyor is so arranged that it will permit of the material being discharged on cars directly behind the machine, or on a track parallel with that on which the machine is operated.

The Halby machine is essentially a shoveler and loader, designed to operate under its own power, forward and backward on a track, with a shovel motion so devised that it makes an advance of about 10 in. into the coal pile, much after the fashion of a man in load-

ing. However, the principle of operation is such that in addition to the advance of the dipper through its motion and through the path of its travel, it is assisted by a simultaneous advance made by the machine itself on the tracks.

The mine car is coupled to the machine, whenever it is being loaded on the same track, and thus the machine and the car are moved together. As the dipper comes to its downward advancing position, the operator, who rides on the machine, advances the machine itself, and as the dipper is returning in its path, he likewise backs up. The dipper makes approximately ten turns per minute, and its capacity is such that under ideal conditions it would be possible to load a ton of coal in even less than a minute. However, as a general average, it requires about 2 min. to load a ton.

The operator, at the same time that he is moving the machine forward and backward, is enabled by the operation of a lever, and with practically no exertion, to move the dipper from side to side, and thus clean up approximately 7 to 8 ft. on each side of the center of the track. The machine is so arranged that it may advance with the dipper in motion, and at the same time swing to either side of the track, simultaneously discharging into a car at the rear, or on a track parallel with that on which the machine is standing.

Shovel Motion of Halby Machine

The propelling speed of the T-700 machine is 110 ft. per minute, and of the T-600 is 100 ft. per minute. The belt speed of the two types is 85 and 120 ft. per minute respectively. Either model will handle coal in large sizes, pieces weighing 1500 lb. being readily lifted on the dipper. The distinguishing feature of the Halby machine lies in its shovel motion, which is such as to permit a smoothly sliding discharge onto the belt.

The Dillig machine (see Fig. 7) is the invention of George Dillig, of Pittsburgh, and is unique in that it adapts, to a low-height mechanism, a shovel somewhat similar to that found on large power shovels. The machine consists of a low frame mounted on four wheels and provided at the top with an open circular track, or turntable, upon which is positioned a revolving outrigger. It is further provided with a conveyor arranged to receive the material immediately beneath the central opening in the turntable, and which conveys the coal and discharges it at the far end of the machine into mine wagons.

The revolving outrigger, mounted on the turntable, carries near its overhanging outer end an oscillating or swinging boom, controlled by means of cables operated by an electric hoisting apparatus shown mounted on the back of the outrigger. To the lower extremity of this oscillating arm, or boom, is attached a bucket, or scoop, free to revolve about its pin center, but controlled by means of a sprocket chain drive, also driven by the electric hoist.

The operation of the machine is as follows: The machine is properly positioned close to the materials to be shoveled; the hoisting cable pulls the swinging boom, with the bucket digging or shoveling, to a limiting forward position. At this point the bucket is made to revolve about a quarter turn or so, in a counter-clockwise direction, around its own pin center. With the bucket now filled and in a turned-up position so as to prevent the coal from spilling, the operator reverses the cable drum and the boom is swung back and carries the bucket to a dumping position, immediately over the centrally open turntable. Here the bucket is given a further counter-clockwise rotation, causing the material to be discharged through the turntable opening to the conveyor beneath. Immediately after the discharge the bucket is given a clockwise rotation and righted, while at the same time the boom swings forward again to attack the pile, and the cycle of operation is repeated.

The arrangement of the outrigger mounted on a turntable and free to move to the right or left of the machine permits the gathering of coal within an arc having a radius of 15 ft. The machine is electrically operated and self-propelled, and weighs 8000 pounds.

Machines belonging to the portable loader class are intended to simplify the manual labor of loading, rather than to displace it. It is a fact, too frequently forgotten, that the height through which the shovel must be raised determines the capacity of the loader. Thus, with the same expenditure of muscular energy to raise the coal, a man will load 29 tons into a wagon 52 in. above the rail, 44 tons into a wagon 32 in. above the rail, and 140 tons into a conveyor 8 in. above the floor, allowance being made for clearance in each case. But impressive as these figures may be, they still do not adequately bring out the advantage of loading into a conveyor over loading into a mine car, for in the act of raising the shovel, the foot-pounds expended in raising the body is greater than the foot-pounds exerted in lifting the coal. When loading into a conveyor coal does not have to be lifted more than a few inches; some of it can be rolled or pushed on, and all in all a tremendous saving in muscular energy is effected.

Construction Details of Westmoreland Loader

The Westmoreland loader is built according to the design of W. W. Jamison, of Greensburg, Penn. It weighs 10 tons, is electrically operated and self-propelled. The truck is rigid, with 12-in. wheels, one front wheel with loose axle, 4-ft. wheelbase, and when in operation the truck is clamped rigidly to the rail. A 3-ft. geared turntable rests on the truck frame, and on this is mounted a solid steel case, 12 ft. long, 32 in. wide and 12½ in. high, which swings free above the wheels through an arc of 160 deg., 80 deg. right and 80 deg. left, the width of sweep being 16 feet.

The steel case contains a ram in the form of a chute, 2 ft. wide, 6 in. deep above the floor, and with an adjustable shovel end at the front. The ram-chute hangs on rollers and is moved forward and backward by a rack and pinion at the top. This represents the unique feature of the machine. This ready horizontal movement of the ram, together with its sweep of 8 ft. on either side of the machine, enables it to keep close to the loose coal throughout the full 16 ft. or slightly more of width, and thus facilitates the work of the laborer.

The adjustable shovel end of the machine takes care of undulating bottom. It is rigid in operation for all sizes of coal, fine slack up to 200-lb. lumps being picked up at the rate of one ton per minute by the chain conveyor in the ram. The actual rated capacity of the loader under fair conditions is 20 tons per hour. Five men are required for its operation, this including the driver. The machine will work in seams that are not

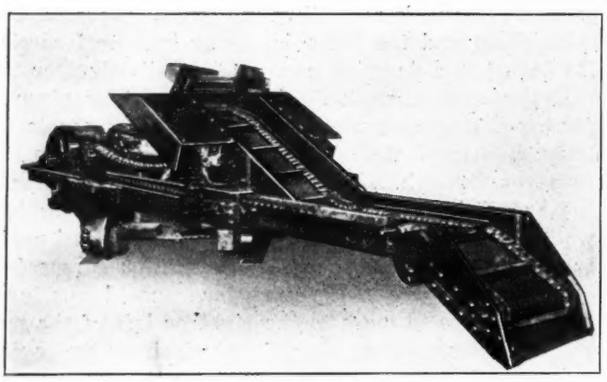


FIG. 8. WESTMORELAND LOADER, SHOWING SWEEP OF RAM

less than 4½ ft. thick, and will pass over curves of as low as 12-ft. radius. The total power requirement is 16 hp., consisting of three reversible motors.

The Jeffrey pit-car loader is a simple conveyor, light in weight and so balanced in construction that it is easily movable across a room. It is driven by an electric motor, so located as to add to the stability of the machine. This device is so simple that it has the distinction of having no distinguishing features in its construction. Its novelty would appear to lie in its cost, which is about one-seventh that of a shoveling machine. It will doubtless appeal to those who contend that coal mining is attended with too many delays to tie up larger amounts of capital in expensive machinery, and attract those who fear that the mine is no place for a machine designed to pick up the coal.

The claim of its maker that the output from a room can be doubled by the use of this machine appears to be conservative. The fact that it requires only two men to operate, whereas other machines require from four to eight, is vastly in its favor, for when the inevitable delays occur it is not difficult for two men to find useful work, in posting, extending track, etc. Quite a number of these machines have been in operation at the mines of the Dominion Coal Co., Canada, some of them for a period of three years, and it has been proved that two men will average from 50 to 75 tons per shift. For moving from place to place the machine is mounted on a small truck.

The Evans scraper loader is the invention of Cadwalader Evans. This device is nothing more or less than an adaptation of the old main-and-tail rope principle to the operation of a modified scraper (equally old) as a means for conveying the coal from the face and out to the roomneck, where it is dumped into the car.

The apparatus consists of a double drum hoist, which may be driven by either air or electric power, two wire ropes of suitable lengths, and a V-shaped bottomless scoop, or drag. In addition to this major equipment, each room is provided with deflectors, loading pans and aprons. All coal is loaded on cars in the entry, the plan being to set a trip of empty cars above the roomneck so that no time will be lost in spotting another car when one is loaded.

In the use of this device, present methods of cutting and loading are followed until the first crosscut is made at a distance of about 20 ft. from the entry. After this is made the scraper may be employed for loading the coal from the entire set of rooms thus connected by crosscuts, as it is through these that the cutting machine passes from place to place. The reason for following present methods of loading until the first crosscut is made is on account of moving the cutting machine, as it will be seen that with the short wooden inclines built in each room and necessary for elevating the coal preliminary to passing into the car, the entrance to the room is obstructed. In passing along the length of a room, or through the crosscuts, the cutting machine moves under its own power or can be drawn by the hoist ropes. There are no rails in the rooms.

The hoist is set in a pocket cut into the entry pillar, preferably midway in the room block that is to be worked. The hoist remains here until the block is worked out, including the drawing of the pillars. At the mouth of the pocket lead sheaves are placed, these sheaves usually being built in sets of three or four so that the ropes may be led to the right or to the left, to the room that is ready to be loaded out.

A part of the permanent equipment at each roomneck consists of two sheaves, mounted on suitable brackets for attaching to props, and used for leading the ropes across the entry and over the car to the face. The tail rope is led up the gob side and around a sheave attached to a jack screw, similar to a mining machine jack, and located near the right-hand corner, and is then fastened to the back of the scoop or drag. The main rope passes around a similar sheave at the left-hand corner and passes to the front of the scoop. It will be apparent that the object of attaching the sheaves to jack screws is to facilitate resetting as the face advances.

At each roomneck loading pans and aprons are installed and are not moved until the block is worked out. Where the coal is high it is necessary to construct a wooden incline, probably 20 ft. long. Where the coal is low and the bottom is taken up in the entry, this incline becomes unnecessary.

The scoop, or drag, is of sheet steel, V-shaped and bottomless. As the scoop is being pulled along the face it picks up its load, and when filled the main rope is removed from the sheave and the hoist starts drawing the scoop to the incline. Here the scoop discharges without the necessity of tipping. After discharge the hoist is reversed and the tail rope pulls the scoop back into position for another cycle. The scoop is flanged at the bottom so that it will avoid digging into the floor.

FIG. 9. VIEW OF THEW ELECTRIC SHOVEL LOADING ON ONE TRACK

It is figured that with rooms of 300 ft. length it is possible to load at least nine tons of coal per hour. The average haul in this case amounts to 150 ft., and the hoist being geared for a rope speed of 300 ft. per minute, the traveling should be done in 1 min. actual running time. Assuming that a minute is lost at the face and another minute at the loading point, there would be 20 trips per hour, which on a basis of 900 lb. per scoop amounts to nine tons. It requires five men to successfully operate the apparatus—one hoist man, one man on the entry to spot and trim the cars, two at the face and one timberman.

The Evans loader has the following advantages: (1) It requires no track in working places after the first crosscut is made, hence it eliminates a considerable labor and material expense; (2) it uses no complicated mechanism, but instead such components as are familiar to all mining men; (3) because of its simplicity delays are few and repairs light, it being quite likely that rope renewals will be the most burdensome item owing to the sharp bends in passing over sheaves; (4) is simplifies the problem of replacing loaded cars quickly with empties; (5) is can be worked in seams of practically any height, although more attractive to low-seam operation than to high; (6) the system is not affected by seams of moderate inclination; (7) in case of falls of roof little or no injury can result since the destructible element, the hoist, is away from the room; (8) it is flexible and can be easily adapted to the drawing of pillars.

Its disadvantages would appear to lie in that (1) the capacity of the system is low; (2) the abrasion of the coal in the scoop as it passes over the bottom, along with the churning of particles, causes degradation of the product; (3) the power consumption in dragging the scoop over the floor and in moving the cutting machine from place to place is large.

Preceding their use in mines power shovels have been used in the construction of tunnels for many years and have demonstrated their practicability for this kind of work. Because of their dimensions the employment of this type for underground loading of coal has been restricted so far to seams of unusual thickness. The Mammoth bed of the anthracite region would appear to be adapted for the use of power shovels were it found horizontal instead of pitching. The bituminous states of the East and Middle West have no beds that yield the required headroom, and it is not until we reach the bituminous and sub-bituminous coals of the Rocky Mountain states that deposits of sufficient thickness to permit the use of shovels may be found.

It is well known that beds of extraordinary thickness occur in Wyoming, and although not ideal because of their pitch, they are in all other respects well suited to this type of loader. The electric shovels are being used by the Union Pacific Coal Co. in the mining of a bed of bituminous coal 30 ft. thick belonging to the Rock Springs group of the Lower Mesa Verde formation.

The contemplation of any device that promises to make two tons of coal appear where but one appeared before, has a fascination all its own. In its development discouragements will be patiently met and endured. It will hearten us to know that the preceding innovations have, in almost every case, been attended with ill success initially, but that the early failures merely served as a goad to those inventive geniuses who refused to lose faith in the soundness of a principle. An improvement here, a strengthening of parts there, along with a change in mining practice, have all combined to overcome the primary defects in every device employed in mining from the ancient atmospheric engine to the modern storage-battery locomotive. We are due to witness again the same persistence, in fact much has already been done. The years spent in patient investigation and experimentation, plus the hundreds of thousands of dollars which have been expended in the development of coal-loading machinery, is already bearing fruit, and will result, I believe, in making these devices as common in mining practice, within the next decade, as is coal-cutting machinery and the electric locomotive at the present time.

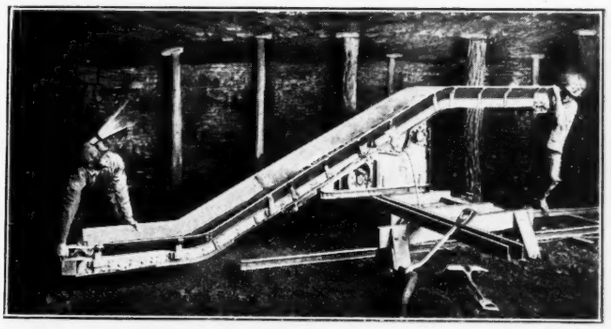


FIG. 10. MOVING JEFFREY PIT-CAR LOADER INTO A NEW POSITION

What will be the machine of the future? Notwithstanding the varied appliances now on the market, the weight of mining opinion has not settled as yet on any one machine as the prevailing type. Nor is it likely to, for the various principles which can be applied successfully to coal-loading machinery, in combination with varied mining conditions, will result, I believe, in the introduction of a variety of types.

In closing it may be entirely unnecessary to caution against installing coal-loading machines of any kind unless the mine is prepared in advance to receive them, and yet, from the experiences of the past it is clear that the importance of this has, too frequently, been either overlooked or else underestimated. It is manifestly unfair to any machine, and unfair to the capital invested in it, to harass its operation with a poor haulage system or an unfavorable method of development. Let us ever remember two things: First, that while machinery has utility it produces revenue only while it is at work, and second, that unless all underground activities operate in harmony, so that petty delays are avoided, no device can achieve the results rightfully to be expected from it.

Coal Mining Equipment in France

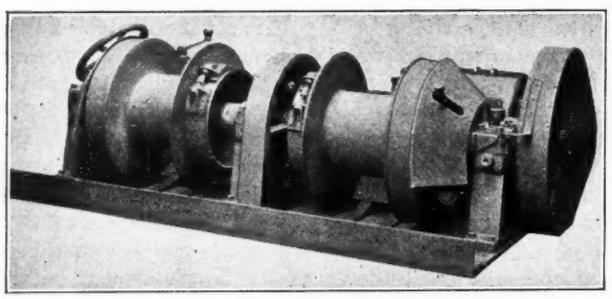
The secretary of the American commercial attaché office at Paris, France, reports as follows under date of Jan. 3: Regarding the matter of reconstruction of the French coal mines, Mr. Cuvelette, Director of the Coal Mine Group of the Comptoir Central, writes this office that all purchases of coal-mining equipment made in the United States will be handled through the Franco-American mission, directed by Mr. Tardieu in Paris and by Mr. De Billy in New York, and that American firms must ultimately address themselves to the office of the latter for the purpose of bidding on mining material.

Electric Winding Machine

By E. M. Mackie
Syracuse, N. Y.

The problem of economical loading of thin-bed coal for a long time has been awaiting a satisfactory solution. In this connection there has recently been under development in the anthracite fields systems of loading by pan and by scraper conveyor. In the bituminous field also some experiments have been made, but the development in these regions has been slow, chiefly because of the winding machines that have been employed.

The main idea in these systems is to eliminate as far as possible the manual handling of the coal, after it has



BACK VIEW OF ELECTRIC WINDING MACHINE, SHOWING WINDING DRUMS

been broken out of the seam. Either system above mentioned consists of a pan or a scraper having a cable attached to each end so that the device can be moved forward or backward as may be desired. To actuate the conveyor a winding machine with two drums is necessary, one drum to wind on and the other to reel off cable. Each drum must be so arranged that it will reel off or wind on the rope, depending on the direction in which it is desired to move the scraper or pan.

From the foregoing it will readily be seen that the winding machine is highly important to the successful operation of these systems. The first experimental trials using such standard makes of winding machines as were available satisfactorily demonstrated the possibilities of these new methods, provided a suitable machine could be developed. The most important requirements are as follows:

1. The highest possible rope speed consistent with safety.

2. A friction drive is necessary for the winding drums, and this drive must be so designed that the friction can be set for a wide range of loads. There must be no slippage when pulling, but slip must occur within a given per cent. of overload.

3. The engagement and release of the drum drives should be accomplished with one continuous movement of the engaging mechanism, in order to prevent locking of the drums and to make possible the instantaneous reversal of the conveyor at the instant of dumping. In loading from a room about 200 ft. deep, this feature of instantaneous reversal saves time equal to one-third of the total required for one round trip of the conveyor.

4. The engagement mechanism should have a neutral position; that is, a position in which both drums are disengaged and will turn freely on their bearings.

5. Each winding drum should be provided with a brake operated by a foot lever, so that in case of cutting off power to stop the hoist, or for any other reason, this foot-operated brake can be set on the reeling-off drum to stop it and thus prevent over-running and consequent fouling of the cable. Furthermore, the operating mechanism of the foot brakes should be so arranged that these brakes cannot be set on both drums at the same time. It should also have a neutral position in which both brakes are free of the drums.

6. The overall height of the winding machine should be not more than 30 in. from the bottom face of the base plate.

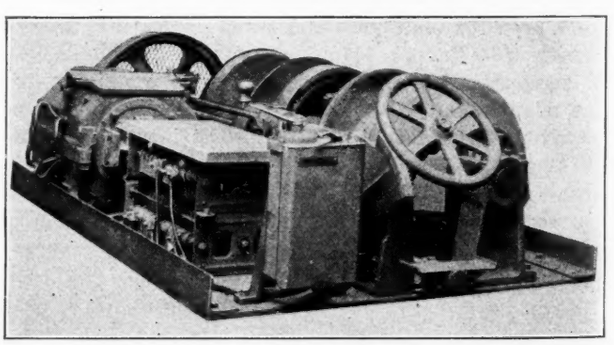
7. The whole arrangement should be as nearly foolproof as possible.

To meet the foregoing requirements the Pneumelectric Machine Co., of Syracuse, N. Y., designed and developed the winding machine illustrated. The machine is mounted on a heavy steel-plate base. No bolt heads, nuts or other projections protrude from the under face of this base plate. Thus there is a smooth, flat underface which facilitates the moving of the machine from one location to another.

Both drums are of the same dimensions and are interchangeable. Drum and intermediate shafts run in bronze bearings which have spherical seats in the housings, insuring free running of the shafts. The bearings are interchangeable on each shaft. The gears and pinions are of steel and the teeth are machine cut. The drum shaft gear is made in halves, thus providing for easy replacement when necessary.

The friction-clutch drive for the drum is of a design not heretofore used for this purpose. It embodies features that make it possible to handle the load in a manner highly essential to the successful operation of these systems, means being provided for automatic loading and unloading, so that the operator is relieved, by levers or otherwise, from regulating this part of the operation.

The elements employed for engaging or releasing the clutch permit the operator to maintain a natural position in a limited space while making the continuous motion in one direction necessary for the engagement of one clutch and the release of the other. This ac-



FRONT VIEW OF ELECTRIC WINDING MACHINE, SHOWING CONTROL EQUIPMENT

complishes the immediate reversal of the scoop at the instant of dumping.

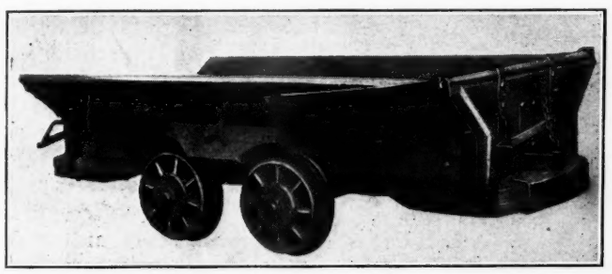
All bearings have ample provision for lubrication with grease, and the gears and clutches are protected by substantial guards. The machine shown is equipped with a 25-hp. motor for 220/250 volts, direct current, and weighs approximately 5000 lb. The overall dimensions are: width, 4 ft. 8 in.; length 7 ft., and height, 29 in. A number of these winding machines are now in successful operation.

Advantages of Standardization of Mine Cars

By H. V. Brown
Cherry Tree, Penn.

In times past, the design of mine cars for any particular operation was a matter that was put into the hands of the engineer, superintendent or foreman in charge of the mine. No thought was given to the importance of using a standardized mine car suited to local conditions, nor to the fact that it is practically impossible for one man, no matter how capable, to work out a new design that will incorporate every possible good feature and be entirely satisfactory in every respect.

We are now in a period of standardization in machinery of all kinds, and there is just as strong reason for maintaining standards in mine cars as in any other piece of mining equipment. The manufacturer who is regularly in the business of building mine cars and who has given careful thought to the development and improvement of his product can in practically every case propose a design to meet certain specified conditions that will be more advantageous than any that can be worked out by a single mining engineer. The reason for this is obvious because the manufacturer has the advantage of experience with different designs and is



THIS STANDARDIZED MINE CAR IS SUITABLE FOR USE IN THIN VEINS

able to eliminate bad features and incorporate those that are desirable.

There is, of course, a wide diversity of opinion between different mining engineers as to the proper dimensions of cars for a certain condition, also as to the proper weight of irons and other details. Many cars are built extreme, either as to lightness or as to weight. As an example, consider the average thin coal bed that will run from 30 to 48 in. in thickness. It is obvious that for this size of vein there are a few designs that are really practicable and efficient. Nevertheless, if one were to study the cars used in various mines operating this thickness of coal he would doubtless find a great number of designs, each embodying some good features, but many undesirable ones. It is here that the importance of standardization and coöperation with the mine-car builder is evident, because in practically all cases a more satisfactory design can be worked out and at a lower cost than if the user is to attempt to specify all the details of his car.

The Cherry Tree Machine Co. has been working along this line of standardization for the past two or three years and has been successful in standardizing several designs, one of the most important of which—a design suitable for thin veins and locomotive haulage—is illustrated. About 2000 of these cars have been placed in service and the design has been found practicable in over twenty mines, all of which have generally similar conditions and heights of coal ranging from 33 to 48 in. This particular car was designed after a careful study of a number of successful cars used in thin-bed work and incorporates every good feature that could be found. The car as built holds practically one net ton when levelful, and when full-loaded will carry 1¼ to 1½ tons, dependent upon the height to which it is topped. The over-all dimensions have been kept within reasonable limits and the iron sizes have been carefully worked out to give the greatest strength with the least weight. The car is admirably suited to locomotive haulage and at the same time is capable of being easily handled in the working place by the miner, as it weighs only 1500 lb. The truck construction is such that the alignment of the wheels and axles is preserved.

The most important advantage of standardization is, of course, that of securing an entirely satisfactory design, suited to the conditions; but there are other advantages to be gained which are well worth careful consideration. Some of these are as follows:

Standardized cars can be purchased at a lower price than special designs, because of the fact that the mine-car manufacturer has developed the production of such cars and has worked out the special dies and fixtures necessary to reduce construction costs; furthermore, he is in better position to purchase material to advantage, especially steel bars, since the item of waste in cutting, etc., can be greatly reduced.

The manufacturer building standardized cars can develop punching and drilling jigs, etc., which make it possible to construct these cars with interchangeable parts and in addition assure their proper assembly, so that the car will be true to gage, perfect in truck alignment and correct as to general dimensions.

Another point in this connection is that the small user who may desire to purchase only five or ten cars at a time is enabled to secure a standard design at a considerably lower cost than a special one, because of the fact that the manufacturer can build these cars on stock orders and is thus in position to sell them in small lots as other standardized machines are sold.

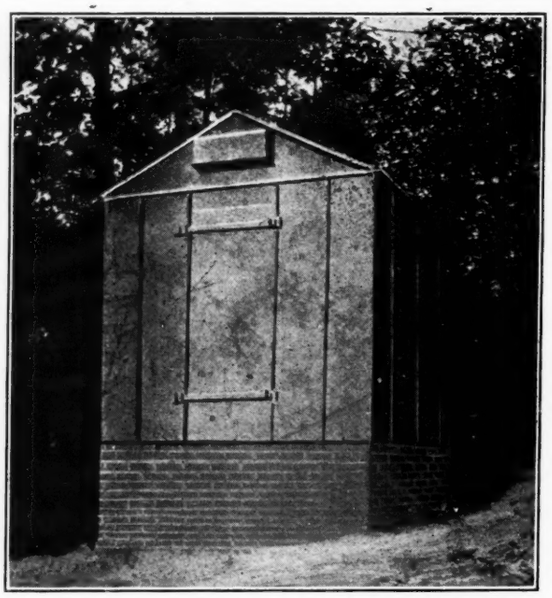
Spring Meeting of the Illinois Mining Institute

At a recent meeting of the executive committee of the Illinois Mining Institute it was agreed to hold the next regular meeting on May 22 to 24, inclusive. Later the Southern Illinois Superintendents' Association requested that this meeting be held on a steamboat on the Mississippi River. An option was secured on the steamer "Golden Eagle," which will expire on May 10. It was agreed to make the trip from St. Louis to Keokuk and return, the boat to leave St. Louis on Thursday, May 22, at 10 a.m. and return to St. Louis, Saturday afternoon, May 24; or, if desired, on Sunday morning the 25th. The price for the round trip per person is $27, which includes meals and berth for the continuous round trip and "Dutch lunch" to be served about 11:30 each evening. The boat will accommodate 150. If enough people signify their intention to take this trip to make it possible to secure the boat then a schedule will be arranged. It is said that the program of papers that is being arranged for this meeting is as good as any that has ever been prepared for the Institute.

Storage of Powder and Explosives at Coal Mines

By E. M. Kimball
Wilmington, Del.

EFFORTS have been made by powder manufacturers for a number of years to induce the miner to pay more attention to the proper storage of his explosives. It has been more or less assumed that any place was satisfactory, and explosives have been kept at any old out-of-the-way point, in a cheap building, or in an old abandoned shed around the property. Often they were stored in pits excavated in a hillside or in some abandoned tunnel. This is continually being noted, and has recently been brought forcibly to my attention in a visit to the coal fields of southern Indiana, West Virginia, western Pennsylvania and Kentucky. The operators, while neglecting their magazines, are at the same time spending large sums of money on their plants and machinery. The first point considered by the operator is, of course, one of economy, but improper storage is poor economy in connection with explosives. The first cost of the magazine is all that is considered in the majority of cases. It seems quite possible that the powder manufacturers themselves are partly responsible for this condition, because of their liberality in the matter of claims. If the explosives go bad, the operator makes claim and this is quite often allowed, even though the maker is reasonably satisfied that the cause of the trouble is not some fault of manufacture but the result of improper storing. On this account the operator does not always recognize his actual financial loss due to improper storage.



MAGAZINE BUILT ON A BRICK FOUNDATION

It should be appreciated that such improper storage brings about a more or less gradual deterioration in the explosives, and this deterioration results in a loss of power. Considerable loss of strength, therefore, may result without the operator becoming aware of it. These losses soon exceed the cost of a properly located and constructed magazine.

The most common fault with the average mine magazine is the lack of protection against moisture being absorbed by the powder. With dynamite excessive changes of temperature or moisture will cause leakage of the liquid base of the dynamite or permissible explosive, and just insofar as this liquid base leaks away or is concentrated in one portion of the cartridge just so far is there an actual financial loss to the operator.

Aside from the question of the proper type of magazine for the maintenance of the proper quality of the explosives themselves, there is the question of location of the magazines as a matter of safety. This point is also often ignored. The tendency is to put the storage house where it is most convenient and "take a chance." All magazines should be located so as to comply with the local and state laws and ordinances, but if laws do not exist they should be located in compliance with the American table of distances, a copy of which will be furnished by any powder manufacturer on request. This table of distances is based on past experience as to the effects of the detonation of various quantities of explosive at various distances, and a permissible distance from dwellings, public railroads and highways is given for all ordinary amounts of explosives. In considering a location for a magazine an operator has to obtain accessibility to the point of consumption, but the safety and suitability of the location should also be given careful thought. In regard to the latter point, low, damp or swampy places should be avoided if possible. It cannot be overemphasized that storage in a cave or tunnel is probably the most objectionable. The question of guarding the magazine against theft may or may not be important, depending upon the conditions at the mine. In the majority of cases, however, a substantial door and a proper lock are advisable, owing to the isolation of the magazine from the ordinary activities surrounding the operation. Good padlocks may be used, but a special magazine lock is by far the best for the purpose. It is believed that the majority of the large powder companies would be glad to quote prices on such locks.

It might be well to outline briefly satisfactory types of magazine construction for the benefit of those interested. If powder, caps or fuse are to be stored, the magazine may be of frame construction and should be fire-protected and ventilated to meet climatic conditions. The following is a brief outline of the construction:

The foundation may be of stone, concrete, brick or posts with enough ventilator holes built into it above the ground and below the floor joists to ventilate the magazine properly. These ventilator holes should have a grating in them to prevent rats and mice from entering and should be built so that an outside fire could not get through into the building. In other words, the holes should not be straight through the wall but have enough angles to stop a flame.

The joists and floor should be sufficiently heavy to hold the load. The floor should be of tongued and grooved boards blind-nailed; no-nail heads or other metal parts should project inside the magazine where it could come in contact with the packages.

Above the foundation the magazine may be of light con-

struction of necessary strength. The outside should be sheathed with ⅞-in. lumber and fire-protected with not less than 26 gage black or galvanized iron. Corrugated asbestos boards may be used. If black iron is used it should be painted and kept painted.

The studding should be sufficiently stiff to resist the load where piles of powder kegs rest against the wall. It is preferable to line the inside of the building with 1 x 6 strips spaced about 6 in. apart, nailed horizontally to the studding, with the nail heads countersunk.

Put sufficient ventilators in foundation and roof. Roof ventilators can be of any standard type, such as the Star or Globe ventilators.

The ground around the magazine should be sloped away from the building to provide proper drainage and to prevent the clogging of ventilator openings.

The door should be made of at least two thicknesses of tongued-and-grooved boards laid diagonally, covered with sheet iron.

If high explosives are to be stored in a magazine it should be bullet-proof, in addition to the requirements given in the foregoing. A bullet-proof high-explosive magazine of course is suitable for the storage of powder or blasting supplies, but blasting caps and electric blasting detonators should never be stored in the same magazine with other explosives. The bullet-proofing of a high-explosive magazine can be accomplished either by a frame magazine, sand-filled, or by building a brick magazine. The specifications for a sand-filled magazine should be about as follows:

Foundations, joists and floor same as specified for powder magazine.

Above the foundations the magazine should be sheathed on the outside and lined on the inside with not less than ⅞-in. tongued-and-grooved boards, the intervening space between to be filled with a weak mortar or with dry sand. If the dry sand is used, care must be taken to have the joists and the boards tight; the lower 6 in. should be filled with a cement mortar to prevent the sand from leaking away. If weak cement mortar is used throughout, a mixture of approximately one part cement to from 7 to 10 parts of sand has been found satisfactory. The thickness of the sand filling depends on the locality. If high-power rifles are in common use from 10 to 12 in. of sand-filling should be used; if such rifles are seldom found in the neighborhood, from 6 to 12 in. of sand will be sufficient. Studding should be placed closely together to carry the weight of the sand. For 6 in. of sand 2 ft. center to center will be satisfactory, where over 6 in. of sand is used spacing of studding should be not greater than 18 in. from center to center.

Where roof can be shot through from surrounding hills, it is well to bullet-proof it also. This can be done by putting in ceiling joists and nailing a second floor upon them, then building a 4-in. rim around this floor and covering it with 4 in. of sand. Where this danger is negligible a bullet-proof roof may be omitted. In warm climates, however, it is well to put in ceiling joists and seal the magazine to assist in keeping down the temperature. In building a bullet-proof roof care must be taken to set back the sand box 2 in. from the wall, in order to provide ventilation between the sand-filled roof and the wall of the magazine.

Specifications applying to a powder magazine in regard to ventilation and outside metal covering will apply to a high-explosive magazine also.

The door should be built of three thicknesses of ⅞-in. hardwood boards covered on the outside with not less than ⅛-in. of steel or boiler plate.

Specifications for a brick magazine are the same as those applying to the sand-filled magazine, with the following exceptions:

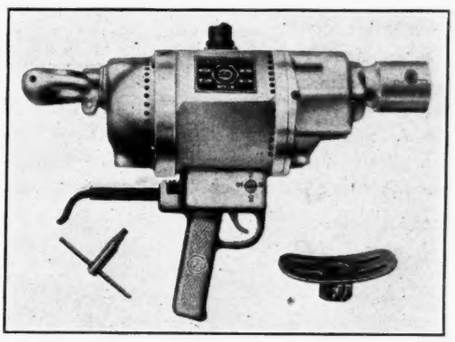
Post foundations, of course, should not be used. Sand-filled walls to be replaced by 9-in walls of medium soft brick laid in cement motar. Inside the brick wall 2 x 2-in. furring strips should be placed vertically, and to these should be nailed the 1 x 6-in. lattice lining such as described for the powder magazine.

All magazines should be built sufficiently large to allow ready access to all grades of the explosives stored, so that the oldest stocks can be used first. Any of the large powder manufacturers will be glad to furnish on request and free of cost plans of any of the types of magazines covered in this article. These have been studied by the manufacturer and developed after years of experience. It has been found that the providing of satisfactory storage is of the greatest value, and every effort is being made to assist the consumer to achieve this result.

New Portable Electric Drill Operated Like an Automatic Pistol

The Black & Decker ½-in. portable electric drill shown in the accompanying illustration is equipped with a ½-hp. motor. Its full-load current consumption is about 700 watts, and the no-load speed 600 r.p.m. The housing is of aluminum alloy, completely inclosing the motor and gears, and the total weight of the machine is 21½ pounds.

The most outstanding feature of this drill is its method of control, the "pistol grip and trigger switch," which makes it possible to handle it like an automatic pistol. One pull on the trigger turns the current on and



PORTABLE DRILL THAT CAN BE HANDLED LIKE AN AUTOMATIC PISTOL

the next pull turns it off. This arrangement enables the operator to control the drill practically automatically, without having to change the position of his hands in order to manipulate the switch. An indicator is provided for the purpose of showing when the switch is on and when it is off.

The electric motor is of the series compensated wound, interpolar type, and uses direct current or 25, 40 or 60 cycle alternating current, and will operate from any two wires of a three-phase circuit. The motor is air-cooled by means of a centrifugal fan mounted on the armature shaft, which draws air in at one end of the motor and expels it at the other.

The gears are cut from high-carbon steel, mounted on ground shafts, and operate in grease in a separate grease-tight compartment. The drill spindle runs in a long bronze bushing against a ball thrust bearing.

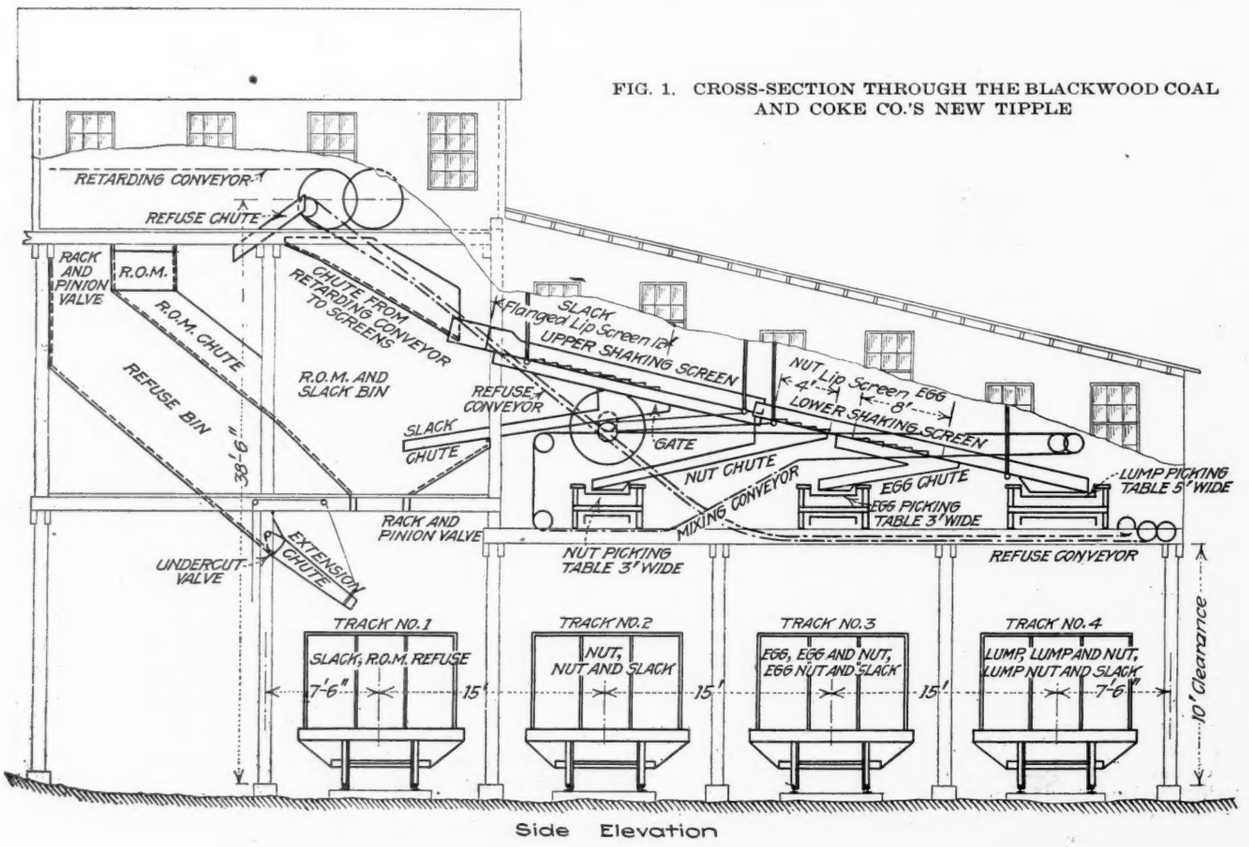
The commutator end cover is entirely separate from the armature shaft bearing, and is therefore easily removable for inspection and adjustment of brushes. This also eliminates the possibility of the armature shaft binding in its bearing, in case the end cover is accidentally distorted by dropping the drill or by exerting excess pressure on the feed screw.

New Coal Tipple at a Virginia Operation

By C. Sharon
Scottdale, Penn.

SYNOPSIS—*Production has been the chief aim of mining companies in Virginia during the past few years. Many tipples have been remodeled while others have been abandoned and new ones built. The new tipple of the Blackwood Coal and Coke Co., here described, is compact yet secures good preparation and embodies means for obtaining almost any grade or mixture of grades the market may demand.*

THE coal fields of Virginia have been the scene of great activity during recent years and have contributed a goodly share of the bituminous coal that this country has been called upon to furnish in the great emergency just past. When the coal operators of the country were called upon to produce their maximum capacity, "Ol' Virginny" came to the front in no unmistakable manner. Surmounting every obstacle, the operators went about increasing their tonnage. They remodeled old tipples whenever they could, or abandoned old tipples and constructed new ones in order to cut down long hauls. The work done by the Blackwood Coal and Coke Co., of Blackwood, Wise County, is typical of this activity. The office of the Blackwood company is at Blackwood, about 5 miles west of Norton, Va., on the Louisville & Nashville and Interstate railroads. The company has coal mines in operation at Blackwood, but by far the greater part of its production comes from the mines at Roaring Fork and Pardee, situated on the Roaring Fork R.R., about 10 miles north of Blackwood.



Side Elevation

FIG. 1. CROSS-SECTION THROUGH THE BLACKWOOD COAL AND COKE CO.'S NEW TIPPLE

At Pardee there has recently been completed a modern plant, the upper headhouse, middle headhouse and a retarding conveyor which leads to the tipple being shown in the headpiece. Coal is loaded onto the retarding conveyor from an upper and lower bed. The equipment in the upper headhouse consists of a kickback dump, receiving hopper and reciprocating feeder. That in the middle headhouse includes a crossover dump, receiving hopper and reciprocating feeder. The retarding conveyor is 588 ft. long with a capacity of 300 tons of coal per hour. It is of the chain-and-scraper type, and consists of a double strand of 24-in. pitch chain, made up of $\frac{3}{8}$-in. steel side bars with 6-in. diameter cast-iron single-flanged rollers, steel bushings and steel pins $1\frac{1}{4}$ in. in diameter. Steel flights 12 x 36 in. are spaced at intervals of 3 ft. The conveyor trough is made up of $\frac{1}{4}$-in. steel plates. In Fig. 2 is shown a cross-section through the conveyor, while Fig. 3 shows the conveyor loaded with coal.

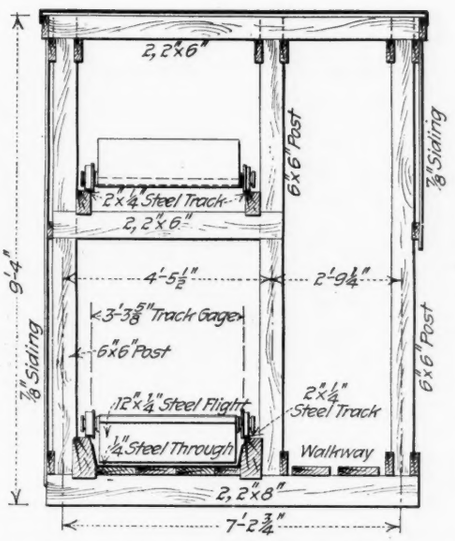


FIG. 2. CROSS-SECTION THROUGH CONVEYOR

The retarding conveyor and the feeder in the upper headhouse are driven by a 40-hp. electric motor. The feeder in the middle headhouse is driven by a 5-hp. motor.

A cross-section through the tipple proper is given in Fig. 1. Much time and attention was devoted to the design of the tipple so as to secure minimum breakage, easy and complete separation of coal and facilities for picking and cleaning. In general, the tipple equipment consists of a double set of shaking screens, picking tables and loading booms for lump and egg coal; picking table and loading chute for nut coal; a slack and run-of-mine bin; and mixing and refuse conveyors. Provision is made for loading run-of-mine coal without operating the screens by means of a valve actuated by rack and pinion placed in the trough of the retarding conveyor. From this opening run-of-mine coal is delivered by a chute to the slack and run-of-mine bin; thence to railroad cars on track No. 1. The upper shaking screen is 6 ft. wide by 21 ft. long and has a screening surface 12 ft. long for slack coal. By means of a fly valve slack coal can be either loaded direct to the slack bin or carried forward to the nut-coal chute on the lower shaking screen, thus securing the advantage of mixing slack with the nut coal. At the loading end of the nut conveyor, and running cross-wise of the tipple over the egg and lump tracks, is installed a conveyor of the drag-chain type. By means of this conveyor nut coal, or a mixture of slack and nut, can be carried over and mixed with either the egg or lump. A valve is also provided in the chute at the head of the nut conveyor so that nut coal can be loaded direct to railroad cars instead of into the mixing conveyor, as described above.

The mixing conveyor is of the drag-chain type and consists of a double strand of steel chain, with side bars 2 x $\frac{1}{2}$ in.; pins $\frac{7}{8}$ in. in diameter; and scraper bars spaced

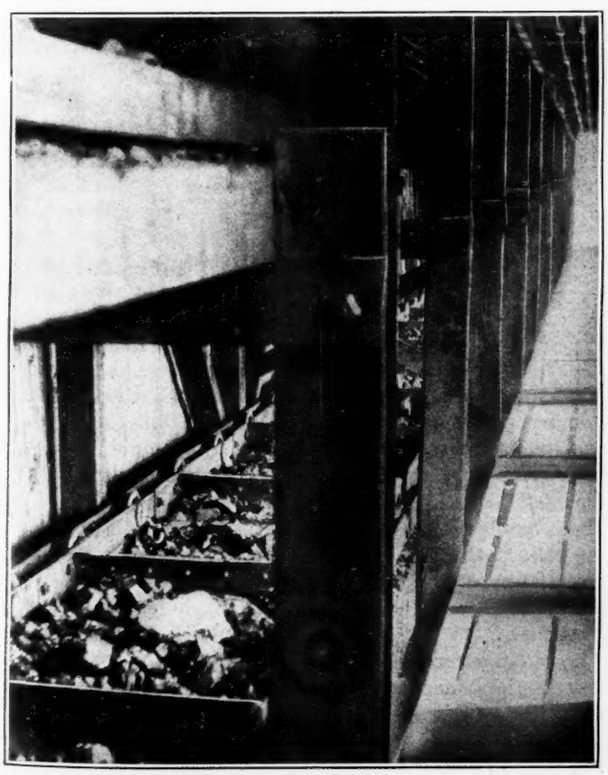


FIG. 3. VIEW OF CONVEYOR LOADED WITH COAL

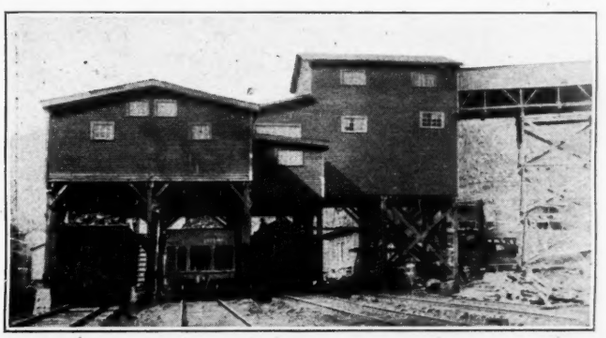


FIG. 4. VIEW OF LOADING TRACKS

FIG. 5. SHAKING SCREENS (NOTE EQUAL DISTRIBUTION OF COAL

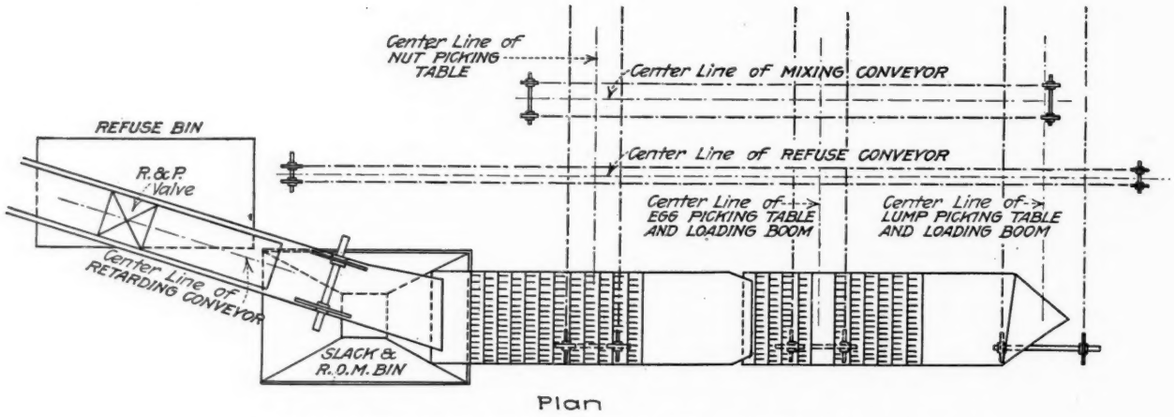

Center Line of NUT PICKING TABLE
Center Line of MIXING CONVEYOR
REFUSE BIN
R. & P. Valve
Center Line of REFUSE CONVEYOR
Center Line of EGG PICKING TABLE AND LOADING BOOM
Center Line of LUMP PICKING TABLE AND LOADING BOOM
Center Line of RETARDING CONVEYOR
SLACK & R. O. M. BIN
Plan

FIG. 6. PLAN, SHOWING SHAKING SCREENS AND CONVEYORS (SEE FIG. 1)

every 2 ft. The conveyor trough is built up of $\frac{3}{16}$-in. steel.

The lower shaking screen is 6 ft. wide by 23 ft. long, with a screening surface for nut coal 4 ft. long, composed of $1\frac{3}{4}$ x $1\frac{1}{2}$ x 12 in. flanged lip screen. The screen surface for egg coal is 8 ft. long, made of $3\frac{1}{2}$ x 3 x 8 in. flanged lip screen. The egg and lump coals are discharged to picking tables having a picking space 16 ft. long. The egg table is 3 ft. and the lump table 5 ft. wide. Fitted to both egg and lump tables, and forming an integral part thereof, are loading booms, each 26 ft. long, by means of which coal can be lowered into railroad cars with a minimum amount of breakage.

FIG. 7. LOADING BOOM LOADING COAL TO CAR

The chain for the nut conveyor, and the egg and lump picking tables, is 9 in. pitch with extended side bars 7 in. high. The steel pans are double-beaded and $\frac{1}{4}$ in. thick.

The refuse from the picking tables is thrown into a refuse conveyor. This runs under the picking tables, up an incline, and discharges into a refuse bin. From here the refuse is drawn at intervals into railroad cars.

The shaking screens and mixing and refuse conveyors are driven by a 35-hp. electric motor through a common countershaft. Friction clutches are provided so that either conveyor can be thrown out of gear if desired. Eccentric shaft for the screens is $4\frac{1}{2}$ in. in diameter. The eccentrics are of cast iron of the ball-and-socket type, while the eccentric rods are made of 6-in. channels placed back to back.

It will be apparent that although this equipment is compact and simple in every respect, yet all conditions are met to insure the production of coal and of nearly every mixture called for by the market. This installation was designed and manufactured by the Marion Machine, Foundry and Supply Co., of Scottdale, Penn. C. J. Creveling is general superintendent of the Blackwood Coal and Coke Co. in this region. Through his efforts the company has made marked progress in the Virginia coal fields.

Pittsburgh Coal Co. Sells Shares to Its Employees

For many years the Pittsburgh Coal Co. has had an association to enable employees to purchase preferred and common stock of the company at the rate of $1 per share per month. When the association closed its books on Jan. 31, 1919, it had 1817 uncompleted contracts calling for the delivery of 16,961 shares. On these contracts $589,966.41 had been paid.

The completed contracts already cover 8748 shares. Thus the number of shares either delivered or to be delivered to the employees on association contracts totals 25,709. A 100 per cent. roll of honor has been started, and 13 different departments have qualified. In these departments every employee has stock. So far not a single mine has that distinction, the honor rolls being attained only by departments at Pittsburgh, Columbus, Buffalo, New York City, Akron and Youngstown, and by the Monongahela Saw and Planing Company.

A Mechanical Blacksmith

A mechanical blacksmith, called the "Utility Hammer," has been developed by the Sullivan Machinery Co., for doing by machine work previously done by hand. It is admirably adapted for rapidly making cutter bits (both pick and chisel point), chisels, wrenches and small tools of all kinds, straps, bolts, small levers, keys and wedges; for forging, welding and straightening rods and bolts; for sharpening miners' picks and crowbars; and for many odd jobs which arise frequently around the mine.

This hammer consists of a rigid cast-iron frame, supporting the guide block, and a vertical engine. Air is admitted to the engine through a pipe connected with some source of air supply, and live air is kept in the lower end of the cylinder at all times. When the foot lever is depressed by the blacksmith, the hammer begins to strike. A single blow may be struck by this hammer or many in succession, either light or heavy as required, and at the will of the operator. The machine has a wide throat, the distance from the center of the die to the frame being 15 in., so that large work can be handled. It takes pieces up to 2 in. in thickness.

SULLIVAN "UTILITY HAMMER"

The four chief advantages of the machine are as follows:

1. *The Vertical Hammer* — The engine is to all intents and purposes the Sullivan FF-12 rock drill—a highly developed machine, the product of many years of labor and experiment. The chief feature of this drill is its vicious slugging blow at full stroke. This can be throttled down by the valve action to a light tap.

2. *The Air Drive*—With a machine of this type, air would seem to be more advantageous as a motive power than belt, chiefly because of its flexibility and ease of lubrication. With air it is a simple matter to lubricate the vertical hammer properly by means of an automatic lubricator; and the air-thrown valve gives a wider range in striking power, and a greater sensitiveness of control than can possibly be obtained with belt drive. Moreover, with air drive the exhaust can be used to blow chips, scale, etc., from the face of the die. This is highly important when cut-out dies are being used, for unless the dies are kept clean scale cuts into them and eventually leads to their being discarded.

3. *The Foot Control*—The foot lever which controls the action of the hammer has a relatively long travel, whereas the valve travel is quite short. This results in close valve control and enables the operator to govern the force of the blow of the hammer absolutely, thereby allowing great flexibility (varying from a light tap to a heavy blow). The operator can feel the action of the valve with fair precision with this long travel of the foot lever for the relatively short movement of the valve.

4. *Rapidity of Stroke*—The hammer is capable of 600 blows per minute and is therefore unexcelled for rapid work.

This machine can be equipped to operate by steam power if desired. Dimensions, weights, etc., are as follows: net weight, 1675 lb.; overall height, 6 ft. 6 in.; depth of base, 29 in.; width of base, 16½ in.; hammer cylinder, diameter, 5⅜ in.; hammer cylinder, stroke, 5¾ in.; air pressure required, 80 to 100 lb.; air consumption at 90 lb., 93 cu.ft. per minute; total striking weight, 100 lb. (Any dies can be made up from blueprints or samples.)

The development of this hammer is the result of the tremendous quantity of chain coal-cutter bits required for mining machines. The hammer is merely the vertical member of the Sullivan drill sharpening machine—the horizontal hammer being omitted because of the lack of necessity for upsetting work in the making of cutter bits.

In the Chicago shops of the builders single hammers have sharpened as many as 2000 chain machine pick-point or chisel-point bits per 10-hour day.

Self-Dumping Cages Help Illinois Mine Make High Hoisting Record

The Orient mine of the Chicago, Wilmington & Franklin Coal Co. on Mar. 6 hoisted 6777 tons of coal from a depth of 600 ft. This is believed to be a new world's record for a shaft mine hoisting one car of coal at a time. To make such a record as this two pieces of apparatus must be thoroughly reliable—the hoist and the cage. Of course, other devices such as the rope, the sheaves, the cager and, in fact, all physical equipment must "stand up" under the stress of such rapid production. The organization also must function properly. Upon the two pieces of apparatus first mentioned, however, the brunt of the stress falls.

It is interesting, therefore, to note the kind and type of hoist and cages employed at this mine. The hoist here used is a Nordberg 28 x 54-in. engine with cylindro-conical drums 7 ft. in minimum and 11 ft. in maximum diameter. The maximum rope speed is about 4500 ft. per minute.

To cage, hoist and dump three or more cars per minute from a depth of 600 ft. requires a cage of great strength and reliability. The cages employed at the Orient mine are known as Olson self-dumping cages and were built by the Eagle Iron Works of Des Moines, Iowa. Their performance on Mar. 6 last speaks well for their reliability under the stress of rapid hoisting.

THE LATEST RECIPIENT of the John Fritz medal was J. Waldo Smith, for his most distinguished service in engineering and great achievement as engineer in providing the city of New York with a supply of water. Similar service is now recognized by the more progressive coal companies, among others, as being a good business move as well as an engineering achievement. Most mining towns tend to encourage unsanitary conditions by reason of many people, comparatively, living in a limited area. The health of such communities is maintained ordinarily by attention to water supply and sewage removal.

Automatic Reclosing Circuit Breakers in Mine Service

BY E. C. RANEY
Columbus, Ohio

SYNOPSIS — *The increasing use of electrical distribution of energy has brought many problems of economy in transmission and operation. Automatic control of various circuits not only protects those circuits and the machinery operating thereon, but also in no small degree lessens the expense of attendance.*

DURING the past few years coal mines have made some radical changes in the method employed for obtaining and distributing direct-current power for mining machines and motors. The old isolated steam plant has largely passed out of existence, and in its place has come the central station delivering current to the individual mines over high-tension alternating-current lines.

At the mines this high-tension alternating current is converted into direct current by means of rotary converters or motor-generators at a suitable voltage. The usual potentials for trolley use are 250 or 500 volts.

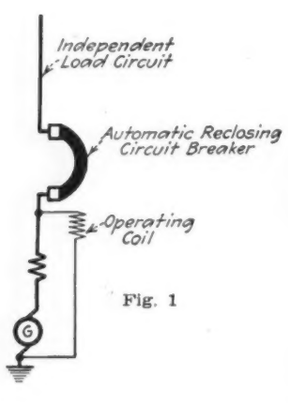


Fig. 1

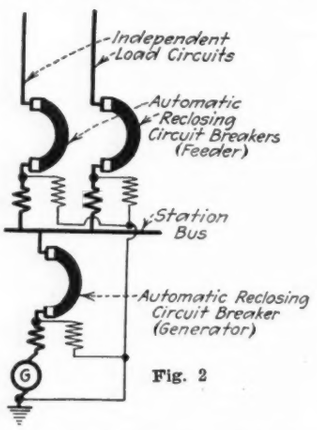


Fig. 2

FIGS. 1 AND 2. BREAKERS ON ONE AND TWO LOAD CIRCUITS

The many advantages of the central-station method of power generation and distribution are too well known to be taken up in this article. I wish, however, to enumerate two of the most important economic advantages to be gained by this arrangement, as a clear understanding of these together with a thorough knowledge of the application of the automatic reclosing circuit breaker to such installations makes possible the proper location and arrangement of equipment to obtain the best results at a minimum cost.

First, by obtaining central-station power for the mine the substation can be located near the load center. This saves a large amount of copper in the feeder lines, reduces power losses to a minimum and increases the output on account of better voltage being available at the motors.

Second, through the use of central-station power the cost of attendance at the substation can be practically eliminated, since it only requires an attendant to start the station in the morning and to shut it down at quitting time. It will be explained later in this paper how the shutting down can be accomplished automatically if so desired.

The operation of substations without an attendant has been made practical by the development of the automatic reclosing circuit breaker and other automatic protective devices. With a station properly protected by these instruments, operation without an attendant is much safer than it would be with an attendant, but with the automatic protective devices omitted. The elimination of the human element is always desirable where the same results can be obtained with certainty by automatic means.

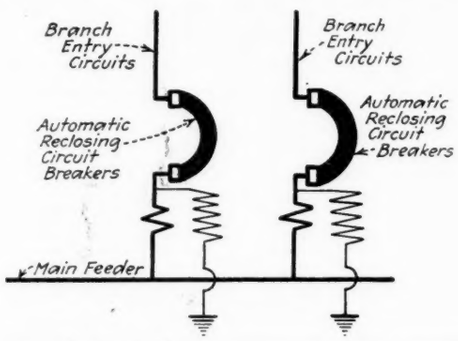


FIG. 3. BREAKERS ON INDEPENDENT CIRCUITS

There are four general classes of protection to which automatic reclosing circuit breakers are applied, each of these classes requiring a different arrangement of control circuits governing the breaker. These may be enumerated as follows: (1) Protection of independent feeder circuits; (2) protection of generator circuits; (3) protection of feeders to a trolley that is also supplied by current from other stations; (4) the sectionalizing of circuits.

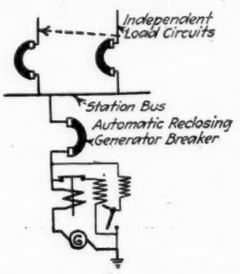


FIG. 4. AUTOMATIC BREAKER BETWEEN GENERATOR AND BUS BAR

Taking up the foregoing classifications of control in their order, Figs. 1, 2 and 3 are simplified diagrams illustrating the application of automatic reclosing circuit breakers to the protection of independent feeder circuits.

Fig. 1 illustrates the most elementary case in which

a single generator is supplying a single outgoing load circuit and is protected by a plain automatic reclosing circuit breaker. Such an instrument for independent load circuits should have the following characteristics: (a) It should open in case of overload, short-circuit, or voltage failure; (b) it should remain open through a definite time interval; (c) it should reclose automatically at the expiration of the time interval provided the short-circuit has been removed; (d) it should remain open without any attempt to reclose so long as the short-circuit or overload exists.

Fig. 2 illustrates a station equipped with a single generator but having two independent load circuits. In

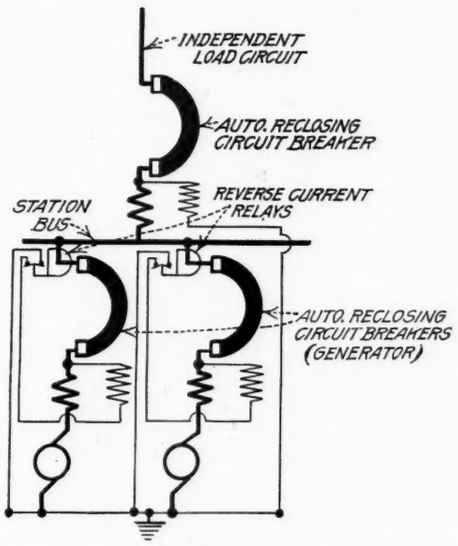


FIG. 5. TWO GENERATORS ON A COMMON BUS

this case an automatic reclosing circuit breaker should be used on each outgoing circuit so that in the event of overload or short-circuit on either section the other section will continue to supply power uninterruptedly.

Fig. 3 illustrates another application of breakers for independent feeder circuits. With this arrangement each important branch circuit is protected by an automatic breaker so that trouble on one section will not interrupt service on the remaining sections. This item is quite important in mines where much trouble is experienced on account of falling slate and other conditions which frequently cause short-circuits to occur on the various lines.

Figs. 4, 5 and 6 illustrate three typical arrangements of circuits wherein generator breakers are required between the generator and station bus. The generator breaker in its simplest arrangement has the following characteristics: (a) It should open in case of overload, reversal of current or voltage failure, and (b) it should reclose automatically at the expiration of a definite

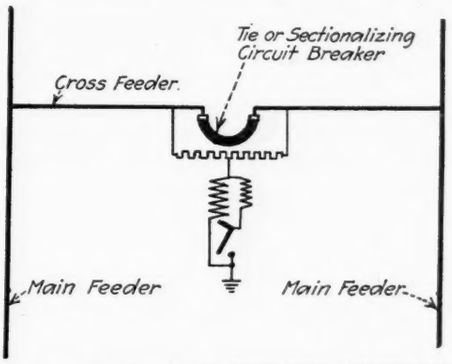


FIG. 8. TYING MAIN FEEDERS TOGETHER

time interval provided the voltage of the generator is at or above a certain predetermined value.

Fig. 4 illustrates an elementary arrangement where an automatic reclosing circuit breaker is used between the generator breaker and the busbar. Each independent load circuit is supposed to be properly protected with automatic circuit breakers.

Fig. 5 illustrates a case where two generators are operating in the same station feeding into a common bus. The outgoing load circuit is protected by an automatic circuit breaker, and each of the generator breakers is provided with overload protection and reverse current relay protection.

Fig. 6 illustrates a station where the generating equipment is protected by an automatic breaker, the operating coil of which is carried through contacts controlled by the alternating-current switch, through thermostats on the transformer and bearings, and through an overspeed device on the rotary converter shaft.

In this case a no-voltage relay is located just above the alternating-current handle so that in the event of the opening of any of the protective devices mentioned the armature of the no-voltage coil will be released and trip open the alternating-current switch. This action opens the direct-current circuit breaker permanently at the same time that the alternating-current switch is

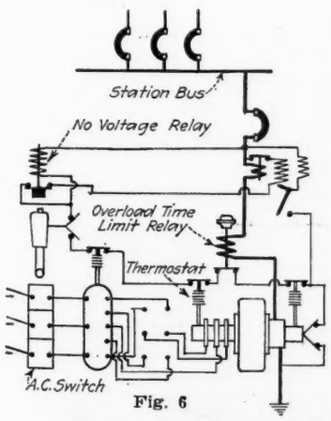


Fig. 6

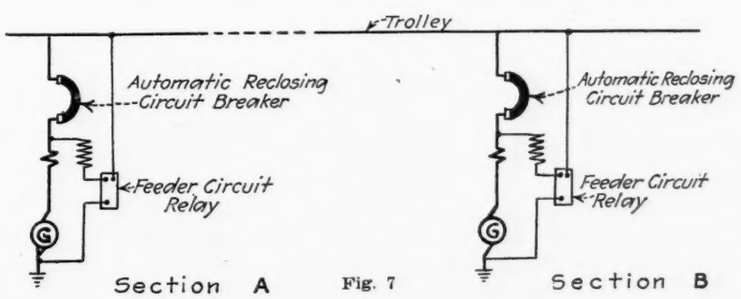


Fig. 7

FIG. 6. AUTOMATIC BREAKERS USED WITH OTHER PROTECTIVE DEVICES—FIG. 7. BREAKERS AT WIDELY SEPARATED SUBSTATIONS

opened. The generator will thus be completely protected in the event of overspeed, hot bearings, a hot transformer or an excessive overload on the alternating-current circuit. The generator breaker, however, will open and reclose automatically in case of a direct-current overload.

Any combination of the foregoing protective features may be used, or this scheme may be extended so as to provide protection against almost any conceivable contingency which would make it desirable to shut the station down. For instance, in some plants where the load demand continues until midnight or after, a time clock is provided which opens the circuit of the no-voltage relay, thus shutting down the station automatically at a predetermined hour without the necessity of an attendant being present.

Owing to the high power losses in transmitting low-voltage direct current it is not advisable to transmit current for power purposes more than one mile at 250 volts or more than four miles at 500 volts. Whenever these distances are exceeded it results either in excessive loss of power or it means that an excessive amount of copper must be used in the trolley circuits.

Where central-station current is available it is usually more economical to use smaller units in motor-generator stations and locate them at intervals of 1½ to 2 miles, as illustrated in Fig. 7. Where this arrangement is employed it is necessary to use a feeder-circuit relay with each automatic reclosing circuit breaker. The object of the feeder-circuit relay is to govern the reclosing of the breaker so that in case the trolley voltage is below a certain value opposite a given station, such as *B* while station *A* is still feeding the circuit, the breaker at station *B* will remain open until the voltage

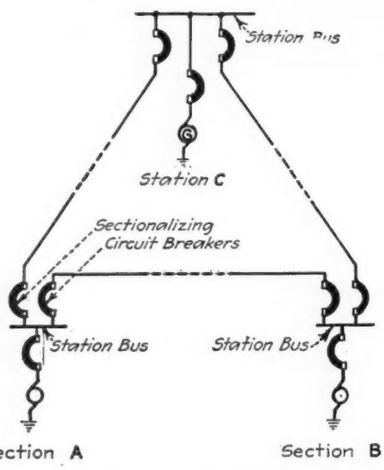


FIG. 9. TYING THREE STATIONS TOGETHER

has reached such a value opposite station *B* that the breaker there will not open immediately after reclosing.

In some instances considerable economy in transmission is effected by tying two main feeders together at some distant point in the mine by cross feeders, as illustrated in Fig. 8.

There is a serious objection, however, to this arrangement unless the cross feeder is protected by some automatic means, so that should a short-circuit occur on one of the main feeders the other will be disconnected during the time that the short-circuit remains effective, and will be reconnected automatically when conditions again have become normal.

In some cases three stations are tied together, feeding into a common network of trolleys and machine circuits, as illustrated in Fig. 9. This makes an ideal arrangement so far as economy of copper is concerned.

With this arrangement the generator at each station should be protected with an automatic reclosing circuit breaker between the generator and bus, and each outgoing feeder should be provided with a sectionalizing circuit breaker. When this plan is followed a short-cir-

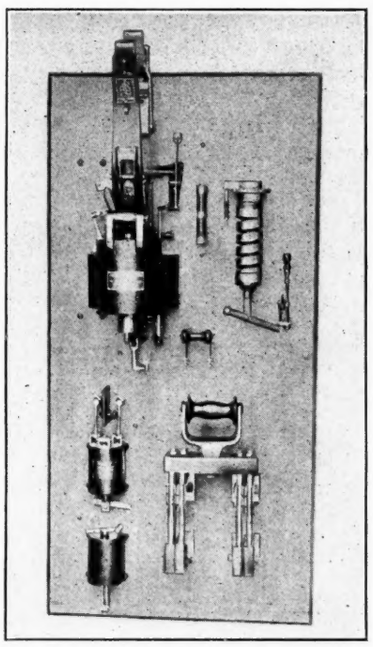


FIG. 10. SWITCHBOARD PANEL WITH AUTOMATIC RECLOSING CIRCUIT BREAKER

cuit between stations *A* and *C* will open the two breakers feeding this section, but operations on the remainder of the system will not be disturbed. Furthermore, with this arrangement it is possible to operate all stations *A*, *B* and *C* simultaneously when the load is heavy, while one or two stations may be shut down during the period when the load is light. The entire system will then be fed from one station.

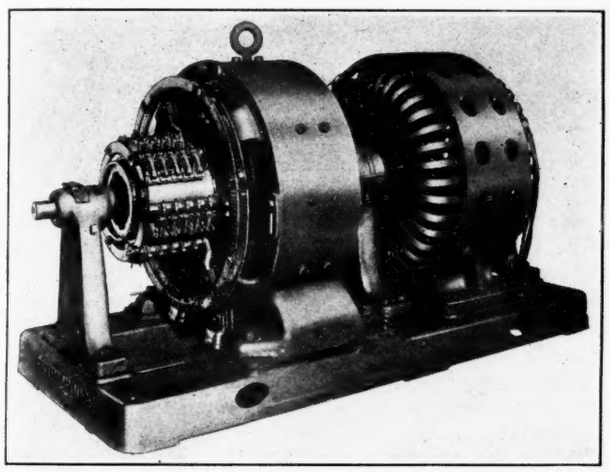
By the use of sectionalizing breakers, when station *A* is supplying the entire system with stations *B* and *C* shut down, current will be fed through the two breakers at station *B* and through the two at station *C*. When feeding in this manner the current in one breaker in each station will be fed in a reverse direction to what it is when all stations are running. This necessitates the use of automatic sectionalizing breakers which will operate equally well with current supplied from either direction. The application of sectionalizing breakers in this manner in a recent development and is one which is of considerable importance in the proper operation of systems of this character.

SOME IMPORTANT American business enterprises in considering plans for expanding their American activities into world-wide activities are concerned over the matter of an American merchant marine. Several of our large corporations, including coal producers, have found it of considerable advantage to own and operate their own vessels. The organization of ship lines by exporting interests and their operation by managements controlled by the exporters would possibly so tie together the commercial and the transportation interests as to make them pay.

New Motor-Generator for Mines

There are periods during the day when the electrical load of a coal mine is light, and then in an instant the demand for power may jump to several times the average. Such conditions occur with the starting or stopping of hoists and locomotives, and demand extra-good peak-load performance of the generating apparatus. This is especially true as regards synchronous motor-generator sets, for the generators are denied the relief afforded by the fall in speed of an engine-driven set, since they run at unvarying speed.

A new synchronous motor-generator set which embodies the continuous power-factor correction common to such sets with high overload and "peak" capacity has recently been put on the market by the Westinghouse Electric and Manufacturing Co. It consists of a type G three-phase, 60-cycle, synchronous motor driving a type SK, 275-volt compound generator. The machine has three bearings, the pedestals and field frames being mounted on a common bedplate. The full-load rating is based on continuous capacity with 35 deg. C. rise on the



EFFICIENT MOTOR-GENERATOR FOR MINE SUBSTATIONS

generator, 45 deg. C. on motor armature and 50 deg. C. rise on motor field, with 80 per cent. power factor. After a two hours' run at 50 per cent. overload, the generator and the motor temperature rise will not exceed 55 deg. C. On test, commutation was satisfactory at 250 per cent. load. The compound field is adjusted to give 10 per cent. increase in voltage from no load to full load.

In addition to commutating poles on the generator, there is a compensating winding placed in slots in the faces of the main poles. This considerably improves the efficiency and gives extremely good commutating characteristics. This winding consists of but one continuous coil per pole. Each coil is form-wound to exact dimensions, and is put into open slots in the pole faces, where it is held by wedges. This construction gives one joint per pole instead of two joints per conductor, as has been the custom in the past, where jumpers were used between bars. No difficulty is found in removing and replacing coils.

The motor is a six-pole, revolving-field machine, provided with squirrel-cage damper winding in the pole faces. This permits of starting the set from the alternating-current side and also insures its stability under sudden variation of load. The field may be overexcited to draw "leading" reactive current from the line, thus compensating for the "lagging" current of induction motors. This helps the voltage regulation, especially where a long transmission line is used. A voltage regulator may be employed, which will hold the alternating voltage constant within the range of the set.

The performance of this set is as follows: Efficiency at one-half load, 81.4 per cent.; three-quarter load, 85 per cent.; full load, 86.5 per cent.; one and a half load, 88 per cent.

Carbonization of Illinois Coals in Inclined Gas Retorts

Under the conditions existing in the winter of 1917-18 it was desirable to use as much as possible of the coal mined locally in order that long railroad hauls might be avoided and that the crowded transportation systems be lightened. Gas manufacturers of the middle west saw the importance of a local supply of coal because of the increasing difficulty of obtaining supplies of eastern gas coal, and many companies considered the possibility of using Illinois coal for at least part of their requirements. A high yield of gas of good quality is the result sought in the manufacture of illuminating gas in retorts. Coke, tar and ammonia are byproducts that are recovered in order to increase the economy of process. Coke is the chief of these byproducts, and its quality should be given consideration in selecting and carbonizing the coal.

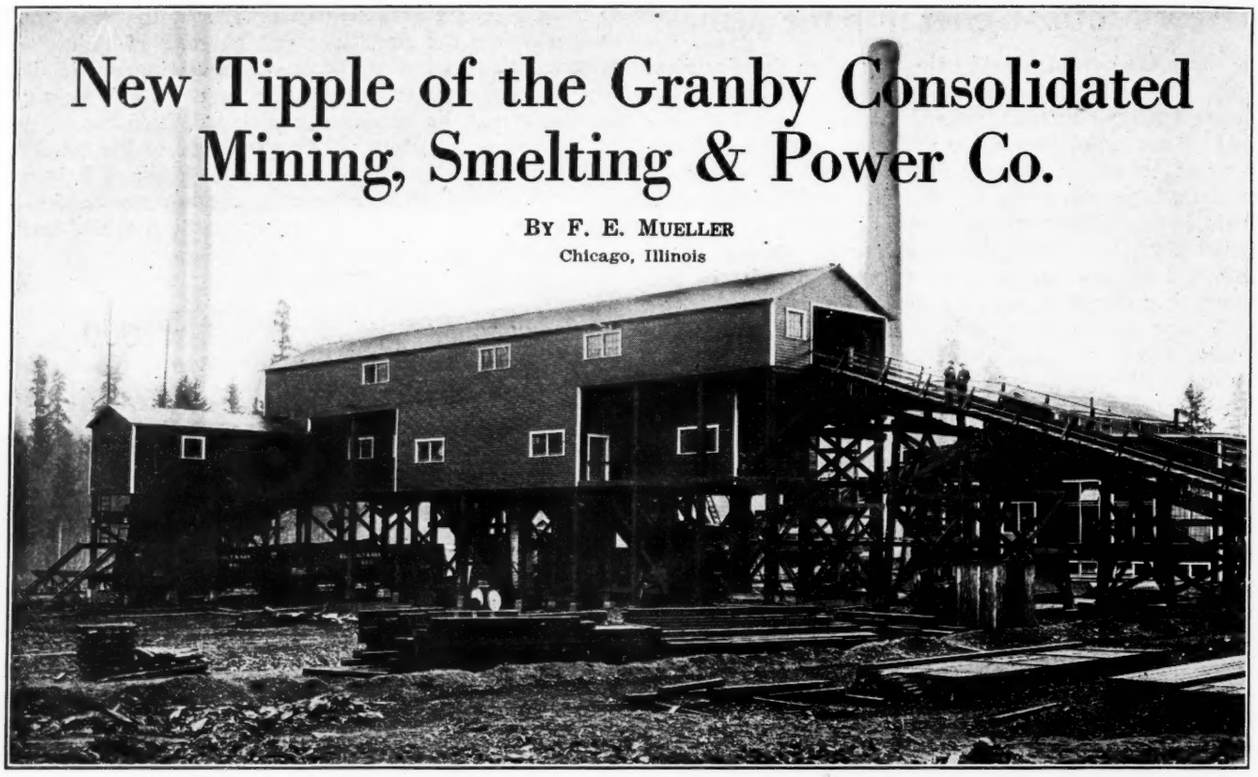
Tests were undertaken in an endeavor to obtain further information regarding the use of Illinois coals in gas retorts. These tests were made by the Bureau of Mines in coöperation with the Illinois State Geological Survey and the Engineering Experiment Station of the University of Illinois. It was desired to ascertain how the quality of the coke obtained was affected by mixing Illinois with eastern gas coal. Where Illinois coals have been used for gas making, the usual practice has been to charge a part of the retorts with Illinois coal alone and the rest with an eastern gas coal.

The coke from the two coals was sold separately; that from the eastern coals was sold for domestic purposes while that from the Illinois coal was consumed at the plant. Another object of the tests was to permit the use of better operating conditions than are possible when the two coals are coked separately. These tests are described in Coöperative Coal Mining Series—Bulletin No. 20—under the title of "Carbonization of Illinois Coals in Inclined Gas Retorts," by F. K. Ovitz.

In this bulletin the following summary of results and conclusions is given: Illinois coal mixed with Kentucky coal before charging yields better coke than Illinois coal alone. If all the retorts are charged with the same mixture, uniform operating conditions can be maintained to insure proper carbonization of all the charges. Coke from Illinois coal alone contained more ash and had more tendency to form clinker than coke from a mixture of Illinois and Kentucky coals. The yield of coke from mixtures was larger than from Illinois coals alone, and increased as the percentage of Kentucky coal was increased. The amount of breeze in the coke made from unmixed Illinois coal was greater than in coke from mixtures. Mixtures gave higher gas yields and consequently enabled greater production of gas with a given equipment than could be obtained from Illinois coal alone.

New Tipple of the Granby Consolidated Mining, Smelting & Power Co.

By F. E. Mueller
Chicago, Illinois



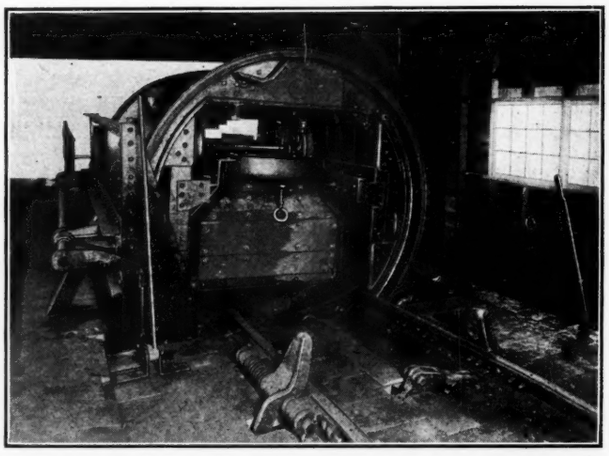
FROM time to time articles and photographs have been published showing coal measures and giving general data covering the new mining plant of the Granby Consolidated Mining, Smelting and Power Co., Ltd., at Cassidy Siding, near Nanaimo, on Vancouver Island. It is not the purpose here to go into details concerning the mine development or the surface plant. It is sufficient to state that the arrangement of the camp, housing facilities for the comfort of the employees, the shops, bathhouse and boiler equipment are second to none in the west, the entire arrangement lending itself readily to the ultimate development of this property.

The engineers entrusted to the Roberts & Schaefer Co., of Chicago, the development of the tipple. In view of the agitation against anything other than a solid body car, and consequently the use of rotary dumps, and also the careful consideration that must be given to the preparation of coal by picking or washing, a description of the general arrangement of this plant should prove of interest.

The general layout of mine car tracks, tipple and proposed washery, together with the location of slope with respect to the railroad tracks, is shown in one of the illustrations. It will be noticed that sufficient room has been provided for the storage of loaded cars pulled out of the slope, the loads being permitted, after passing over the knuckle to drift down grade at ground level to the loaded trip feeders, which push the cars one at a time onto the loaded car-haul.

Another illustration shows the mine car that is in use at this property. The loaded car-haul and tipple are of sufficient capacity to handle three cars per minute. The headpiece of this article shows the completed tipple, the Marcus house, and at the extreme left the loading boom shed.

After the cars have reached the top of the loaded car-haul they drift over a platform scale and then on toward the rotary dump, which is also illustrated. This rotary dump is of the Head-Wrightson type—the Canadian rights of which, together with those of the Marcus patent picking table screen, have been entrusted to the care of the Roberts & Schaefer Co. since the outbreak of the war. This type of rotary dump is not new to coal operators of western Canada, as it has been in successful use at a number of mines; but probably nowhere has it operated with a car of such large capacity as at Cassidy Siding.



VIEW OF THE ROTARY DUMP AND MINE CAR

Another feature of interest in connection with this dump is that it is provided with Mining Safety Device Co.'s feeders so that the feed of cars to the dump is automatically controlled, thereby avoiding delay and liability to wrecks which might occur if the cars were not regulated into the dump. All parts of the car feeders

and revolving dump are of substantial construction and are easily accessible in case repairs are necessary.

The empty cars standing in the revolving dump are started forward by the load entering, the arrangement of tipple tracks being such that empty cars run by gravity from the rotary dump to the kickback and thence to the empty track. From here they are lowered by means of a car-haul to the ground level, whence they can drift on to either of the empty storage tracks for making up trips preparatory to lowering into the slope.

Provision has been made for handling mine cars loaded with rock by taking them off at the head of the loaded car-haul and passing them over a rock track, which leads to a rock bin. This, however, is for future requirements, at which time a duplicate revolving dump will be placed over the rock bin. The empty rock cars will drift by gravity back to the empty mine car track of the tipple and thence on over the down haul to the empty yard.

For the early development of the mine the rock will be handled over the rotary coal dump. A bypass is provided in the chutes leading from the dump so that the rock can be diverted into a temporary rock bin from which it is disposed of by means of wagons. Provision is also made in connection with the rotary dump and chutes leading therefrom to handle local-trade (or house) coal.

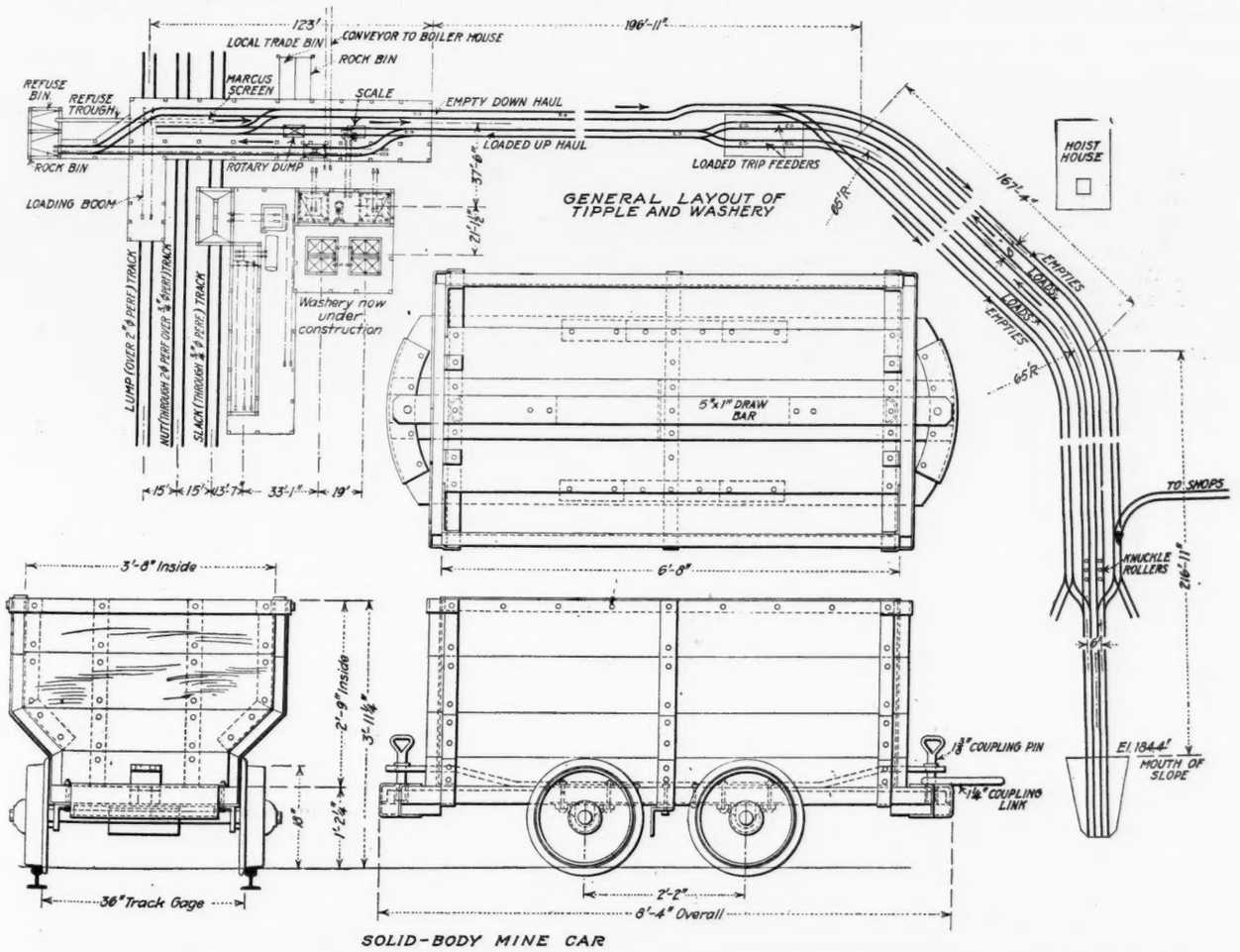
The coal from the rotary dump is delivered into a receiving hopper from which it is mechanically fed onto a Marcus horizontal screen 5 ft. wide, the upper deck of which is provided with perforated plate for producing lump, nut and slack coals on three tracks, or combinations of these sizes as may be desired.

Provision is also made in connection with the Marcus screen for diverting the nut and slack coals to a conveyor which delivers this mixture to the elevator of a washery which is now being installed, or the slack from the tipple can be diverted to the conveyor leading to the boiler house.

Pickings from the table are carried forward in a pickings trough which shakes with and is part of the screen proper. These pickings are delivered to a refuse bin built in conjunction with the rock bin. Provision is also made in the tipple for delivering bone coal to a crusher from which it is conveyed into the boiler house.

Ample facilities are provided in connection with the screen for thoroughly picking the lump coal. After passing over the lump perforations this is delivered without breakage onto an apron conveyor type of loading boom which lowers it into railroad cars.

With the arrangements provided for handling mine cars and the facilities for preparing and handling the finished coal products, the preparation here given should prove one that will permit of low-cost output. When the washery is built this mine will load a product onto railroad cars that will be among the best of the island coals.



GENERAL LAYOUT OF TRACKS, TIPPLE AND PROPOSED WASHERY, AND DETAILS OF SOLID-BODY MINE CAR IN USE AT THE PLANT

The Gasoline Locomotive Underground

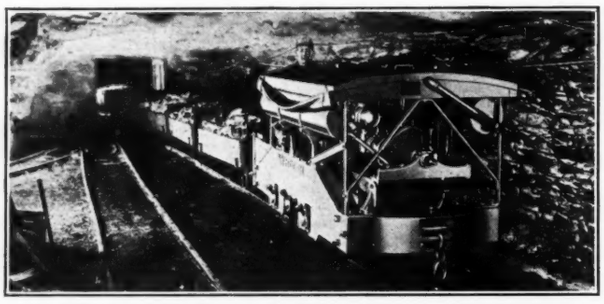
By Paul Teas
Cleveland, Ohio

The old mine mule has had his day, not alone in outdoor work but underground as well. Mine owners long ago accepted the gasoline haulage unit as a valuable investment for outside haulage, but many have been slow in discovering that its usefulness reaches underground also. The facts are that nearly all of the good qualities of the locomotive in open-air work apply equally within the mine. Among these are the following:

1. Ability to haul longer trains and to move a greater tonnage per hour than would be possible with all the animals that could be put on the job. A marked reduction in the per-ton cost of getting out the coal naturally follows.

2. Simplicity of construction and ease of operation make it possible to man the outfit with comparatively unskilled labor.

3. Low operating cost. Fuel consumption runs usually from 7 to 15 gal. of gasoline per day, depending, of course, on the tonnage handled, distance traveled and grades encountered; also, to a degree, on the quality



GASOLINE MOTOR OPERATING UNDERGROUND

of the fuel. Two men handle the outfit—one motorman and one brakeman.

Making a liberal allowance for fuel, lubrication, wages, and interest and depreciation, the operating cost of the mechanical unit, in proportion to what it does, drops far below that of animal haulage. Furthermore, the locomotive is always ready for service, works winter and summer alike, and requires little or no care when not running.

Makers of gasoline locomotives who have studied underground haulage assert that success depends largely upon the proper adjustment of the carburetor—to secure a "lean" mixture of gasoline vapor and prevent the production of carbon monoxide gas—and upon a fair condition of ventilation within the mine.

The average operator, checking up conditions at his own mine, is not likely to encounter any serious obstacle to the operation of a locomotive to the limits of his trackage. In this connection the experience of some prominent companies are interesting.

The Central Fairmont Coal Co., Clarksburg, W. Va., with a drift mine running back about 5760 ft., operates gasoline locomotives with entire success. This mine is ventilated with only one fan, and the locomotives have to pull against a stiff grade. This makes a strong case in favor of the locomotive, since the tendency to throw off heavy fumes naturally would be greater when pulling against heavy resistance than when running on the level or down grade. The owners consider this as convincing evidence that underground gasoline locomotive haulage is a particular success in this instance.

Another drift operation near Clarksburg also reports good results from a gasoline locomotive under similar conditions. The Francois Coal and Coke Co. operates about 500 ft. from the mine entrance and ventilates with one shaft. This company has used gasoline haulage for some years and is well pleased with the results secured.

At Reynoldsville, W. Va., the Hutchinson Coal Co. has placed its underground haulage upon gasoline locomotives with good results. Over in the Keystone State other concerns have shared this experience, among them the W. A. Stone Fuel Co., at Pt. Merion, and the Irwin Gas Coal Co., of Greensburg. Both firms state from experience that the gasoline locomotive when given a fair chance will work as well "down below" as in the open.

Supporting evidence comes from other mining fields. The American Gypsum Co., for example, had to "sell" the idea of gasoline haulage to the state inspector before he would sanction such an installation at the company's mine at Akron, N. Y. The haul here is approximately one-half mile underground. Ventilation is had through an airshaft about 3700 ft. back from the main shaft. The roof is quite low, and the locomotive pulls against a stiff grade under load. Not until the inspector had made personal investigation would he "O. K." the purchase of a gasoline outfit. Riding directly back of the locomotive—a Plymouth—he gave it a thorough trying-out. His report was conclusive—"combustion and air circulation thoroughly satisfactory." The Gypsum company has since purchased a second locomotive of the same kind.

The McKinney Steel Co. has several gasoline locomotives at work in its "gopher" mines at Virginia, Minn. These work back as far as 1000 ft. from the opening. The "85" Mining Co., operating a gold mine at Lordsburg, N. M., and the Southern California Edison Co., at Inyokern, Cal., both have reported good performance by gasoline locomotives underground. Ventilation in the former case is through a single air shaft, and the haulage zone extends back 800 ft. from the mine entrance. The Edison company is putting through a hydro-electric project that includes the driving of two tunnels. The haulage unit in this instance operates about a mile underground. Ventilation is provided through air pumped through pipes to the face of the work.

A reliable locomotive is cheaper in first cost than enough mules to do the same work; it will cost less to operate and keep up. It may be installed without making any important changes in tracks or other established equipment. Such a machine will start at a turn of the crank, will go nearly everywhere quickly and with big loads. When it stops, practically all the expense connected with it stops. These are the salient considerations in favor of gasoline locomotive haulage.

Only one mine in Ohio is operated by longwall, that of the La Belle Iron Works at Steubenville. The working face at the Rail and River mine in Belmont County, Ohio, is situated on an average 4¾ miles away from the entrance. The general trend in the Ohio coal field is a dip of about 27 ft. in the mile (or about a half of one per cent.) toward the southeast.

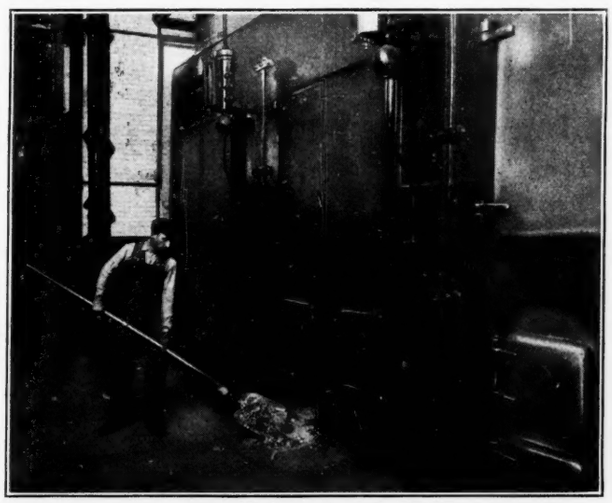
Money Saved by Use of Steam Jet Ash Conveyor

By Guy S. Hamilton
Chicago, Ill.

The Canada West Coal Co., Ltd., of Tabor, Alberta, has five 150-hp. boilers and one 500-hp. boiler installed in its boiler plant. The coal used is a fine dirty slack which has been stored on the open prairie. Owing to the inclusion of mining machine dirt, this contains about 25 per cent. of ash.

This percentage of ash is not greater than that used in many other coal-mine boiler plants, and the ash-handling problem encountered is paralleled by that of many other mines. How could the daily accumulation of ashes be quickly and economically conveyed from the boiler room to the disposal station some 250 ft. away?

The Canada West company was employing two ash wheelers whose sole duty was to wheel the ashes from the boilers to a dump wagon outside. Here the ashes were reshoveled into the wagon and the teamster hauled them to the dump pile or disposal station. Three men and a horse were kept constantly employed at this work. They were not used for any other purpose.



INSTALLATION OF STEAM JET CONVEYOR RESULTED IN LARGE SAVING IN MANPOWER

The officials of the mine felt that the scarcity of labor warranted the use of the men available at some more productive labor, and accordingly quietly cast about for some sort of mechanical equipment that would take the place of the ash handler. They finally decided to install the steam jet conveyor as a means of ash handling.

About a month ago J. R. Howard, the general manager, wrote to the manufacturers—the American Steam Conveyor Corporation, Chicago—concerning the economies effected by the use of this equipment, setting forth the following figures:

COST OF ASH DISPOSAL PREVIOUS TO INSTALLATION OF ASH CONVEYOR, PER 24-HOUR DAY	
2 Ash wheelers @ $5.44	$10.88
1 Teamster @ $4.08	4.08
1 Horse and feed @ $1.50	1.50
Total	$16.46
COST OF ASH DISPOSAL AFTER INSTALLATION OF CONVEYOR	
1 Laborer, 9 hr	$4.08
Saving per 24-hr. day	$12.38

It will be noticed that no charge is here made for steam, but the laborer does not spend his entire time handling ashes. Between fire cleanings he acts as assistant fireman and boiler-room helper.

The conveyor installed in the plant consists of a line of pipe into which the ashes are fed and through which they are carried to a discharge point by current action. Thus this is not a mechanical conveyor. Nothing moves but the ashes and the current of air and steam. This current is created by the action of a jet of high-velocity steam in the direction of the travel of the ashes. This steam discharge tends to create a vacuum behind it, which in turn creates a current of air through the air intake in the line.

Ash intakes are located conveniently in front of the boiler ash pit door so that the firemen can rake the ashes into them with the least effort. The powerful suction pulls the ashes through the system toward the "steam unit fitting," or that point where the steam is introduced into the system. Here the force of the steam itself ejects the ashes through the remaining or "discharge line" of the system. All the ashes from a cleaning can be handled in about 7 min. The grade of the conveyor pipe line rises about 8 per cent. for 200 ft., then 45 per cent. for about 40 ft., discharging onto an open pile.

The upkeep of the system has been relatively small—less than 1 per cent. of the first cost of the equipment during the year it has been in service. During the 300 working days of the year this conveyer has saved for the Canada West Coal Co. a sum amounting to $3714, more by half than the first cost of the system. And every day it is paying a handsome percentage on the original investment.

The steam-jet ash conveyor has intrinsic merits of which saving money is but one. Boiler-room cleanliness, absence of dissatisfied labor, convenience of operation, are considerations that make it desirable.

Illinois Coals Supplant Eastern Coke in Gas Manufacture

Certain Illinois coals instead of eastern coke can be used for the manufacture of water gas and at a considerably decreased cost, according to experiments that have been made in the city gas plant at Streator, Ill. This means the utilization of nearby coals at water-gas plants in the central states instead of having to depend upon the coke from eastern coals that have to be transported some distance.

Last winter Governor Lowden of Illinois appointed a state technical committee on gas, byproducts and public utilities, and through the committee a coöperative experimental program on gas manufacture was outlined by the Illinois Geological Survey, the University of Illinois, the Illinois Gas Association and the Bureau of Mines, Department of the Interior. Engineers from the Bureau of Mines and the State Geological Survey obtained permission to make their experiments with the Streator gas plant, which supplies gas for the entire city of Streator. In these experiments the engineers were able to obtain the same capacity of the plant when using Illinois coal as formerly was obtained with eastern coke and at probably a decreased cost.

Coal Transportation by Aerial Tramway

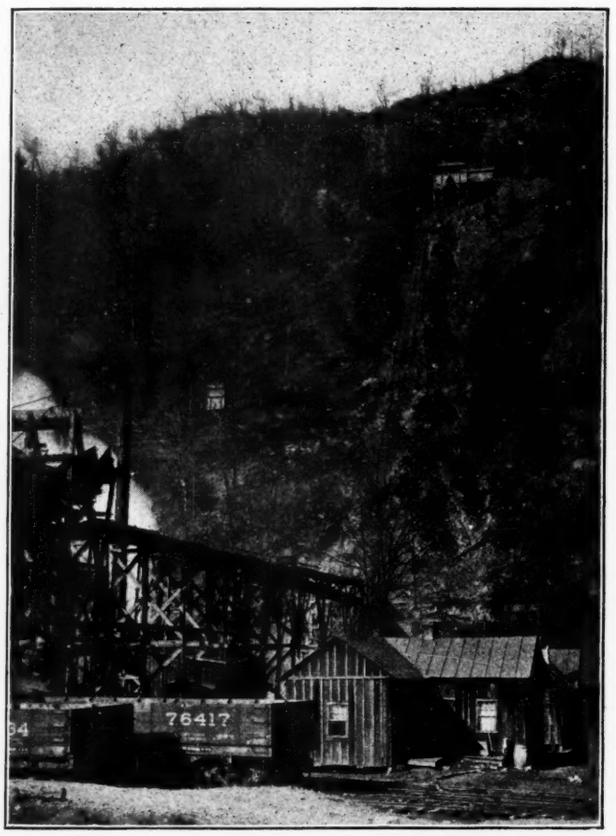
By F. W. Grice
St. Louis, Mo.

During the last few years the aërial wire rope tramway has played an important part in the development of the coal-mining industry. The wartime need for more coal created a demand for a simple and efficient method of transportation from mine to tipple, a method free from the usual delays and interruptions, and one that could be depended upon to perform its work day in and day out regardless of weather conditions.

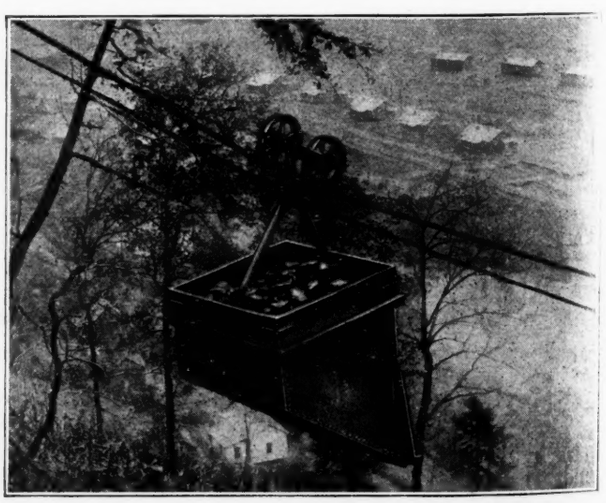
The adoption of the aërial tramway, particularly in the mountainous sections and where streams had to be crossed, has proved satisfactory and has resulted in a considerable reduction in operating costs. In a number of instances inclines have been discarded and aërial tramways installed with good results. The number of attendants has been reduced, a higher capacity developed, and delays in operation practically eliminated.

An example of an installation of this kind may be found at the plant of the Rex Coal Co., of Kitts, Ky. The mine of this company is located near the top of a steep mountain at the foot of which is a small river. The railroad and tipple are on opposite sides of this stream. Formerly an incline was used to bring the coal down the mountain side. The track thence led across a trestle to the tipple. When the need for greater capacity and efficiency arose with the outbreak of the war, the installation of an aërial wire rope tramway was decided upon. This installation was completed in the latter part of 1917 and has been in successful operation ever since. With the completion of the tramway the incline was abandoned.

This tramway is of the gravity, two-bucket or jig-back type, installed in a single span without intermediate supports. As the name implies, it consists of two buckets operating back and forth upon separate parallel track cables. These buckets are so spaced that when one is at the loading station at one extremity of the line the other is at the opposite extremity at the discharge station. They are controlled from the loading station by means of a small endless haulage rope. The coal is brought out of the mine in cars and dumped into a 50-ton bin at the loading station. One man loads the buckets and controls the entire operation of the line. At the tipple or discharge end the buckets dump the coal automatically into a chute leading to the shaker screens. Maintenance on this equipment has been low, the operation, adjustment and oiling being taken care of by the one attendant. Oiling of the track cables, over which the buckets run, is accomplished automatically by means of oiling devices mounted on the buckets themselves.



Another application of this method of transportation is at the mines of the White Star Coal Co., White Star, Ky., where two aërial tramways of the two-bucket type have been installed. The purchasers state that they



TYPICAL EXAMPLES OF AËRIAL TRAMWAY INSTALLATIONS AT KENTUCKY COAL MINES

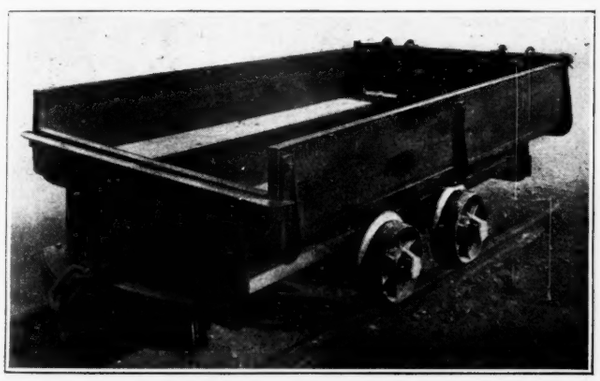
ave been operating these tramways for over a year, ave never experienced trouble of any kind with them nd consider them superior to the incline. Inasmuch as his firm also operates two inclines, this statement carries considerable weight.

Details concerning the operation of these tramways may be secured by writing to H. H. Bennet, secretary and treasurer of the Rex Coal Co., Kitts, Ky., to W. L. Hammond, general manager of the White Star Coal Co., White Star, Ky., or to the Broderick & Bascom Rope Co., St. Louis, Mo., which furnished the installations.

New Type of Mine Car

The Anniston Steel Co., of Anniston, Ala., has recently produced a type of mine car that embodies several novel features in design. The specifications for this car are as follows: Capacity, 2000 lb.; inside length, 7 ft.; inside height, 18½ in.; height above rail, 30 in.; width at top, 4 ft.; diameter of wheels, 12 in.; track gage, 36 in.; wheel base, 20 inches.

All body irons are made of structural shapes formed to exact dimensions. Stiffening bars are made from Z-bar, 1¾ x 2 x 1½ in., all riveted to the body binders and bolted at each end to the bumper. This holds the



MINE CAR THAT POSSESSES MANY NEW FEATURES

car in perfect alignment. The drawbars are made from 2 x 3½ x ⅜-in. tees. Attached to the ends of this bar are electric cast steel drawbar hooks and eyes, with electric forged steel hitchings.

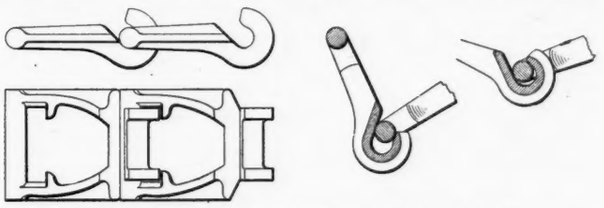
The assembly of the truck and its attachment to the bottom of the car is either by 3 x 3 x ⅜-in. angles or by 10-in. 15-lb. channels, as required. In either case these are riveted to the body irons as well as the drawbar and stiffening Z-bar. The wheels are provided with a ⅜-in. pipe plug for oiling purposes. The axle housings are bolted through the channels or angles, passing through the entire bottoms and inside washer plates.

The axles are made from sufficiently high carbon steel to permit turning and hardening to exact dimensions that portion used for a bearing surface. The wheels are of electric cast steel, cast in steel chillers to insure their being perfectly concentric, thus facilitating the machining and boring. These wheels are greased or oiled before assembling and are bored to a tolerance of 0.002 in. for application of the Hyatt shock absorber roller bearing. The housings are also electric steel castings, designed especially to prevent dust and other disintegrating substances from entering the bearings and are well packed with felt for this purpose. The oak used is the best grade found on the market.

A New Sprocket Chain

A new type of sprocket chain link has been invented by J. C. Law, of Carbondale, Penn. This chain is designed to obviate the shortcomings of the ordinary link belt, particularly in respect to the weak portion of the link where its side is notched to permit the attachment of one link to another.

A lug projects inward from either side of the link to bind against the hook of the next link and thus to pre-



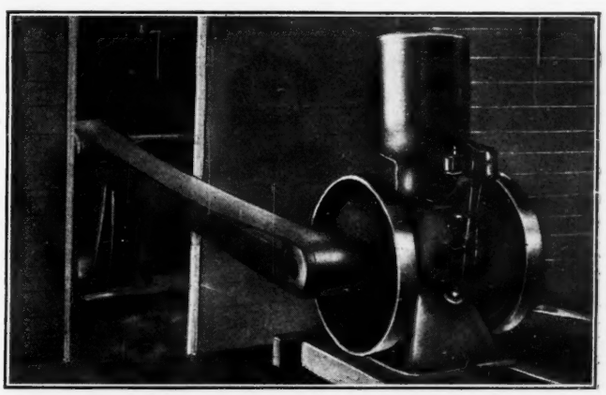
DETAILS OF SPROCKET CHAIN LINK

vent the two from becoming detached. In connecting links together they may be joined by simply placing them at right angles and slipping the end bar of one into the hook of the next. Adjacent links will not become detached in any position they normally assume.

This chain link is designed to work upon ordinary sprockets. The two chief advantages sought are greater ease of connection, link to link, and greater strength. It would appear that both of these objects had been accomplished. This type of chain will be placed upon the market in a few months.

Driving Fans by Means of Internal-Combustion Engines

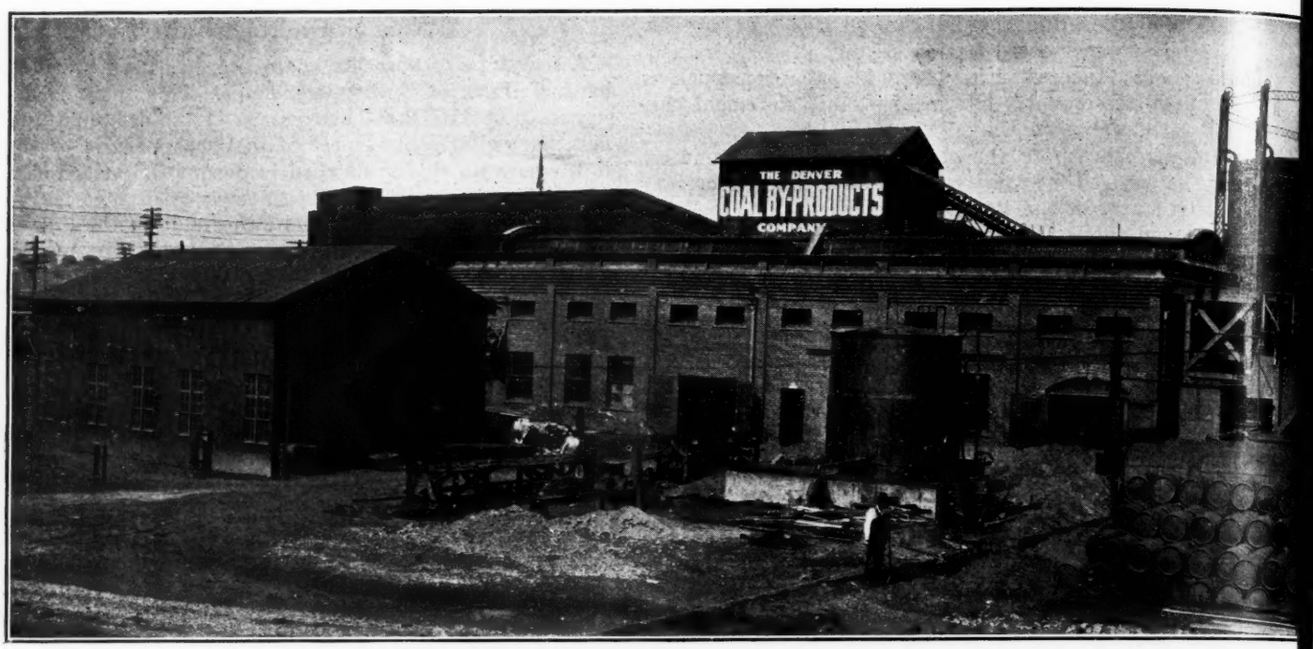
Many medium-sized coal and metal mine owners have been installing gasoline and kerosene engines lately for operating their ventilating fans and blowers. As the air shaft is sometimes quite a distance from the main power plant, it has been found economical to operate the fans by internal-combustion engines. The cost of



THIS ENGINE DRIVES A FIVE-FOOT FAN

both installation and operation is small. Exact figures on this point are not available, but generally where air shafts are in out-of-the-way places that are hard to get at, a light compact engine makes the best power unit. The accompanying illustration shows a 6-hp. Novo engine driving a 5-ft. fan at a mine of the Kanawha Coal Co., Charleston, W. Va.

A mine owner should be careful in the selection of an engine. A reliable and simple machine that will stand the day-in-and-day-out grind is the only kind to buy.



PLANT OF THE DENVER COAL BYPRODUCTS CO., THE LARGEST LOW-TEMPERATURE COAL BYPRODUC

G-L Low-Temperature Carbonizing Process

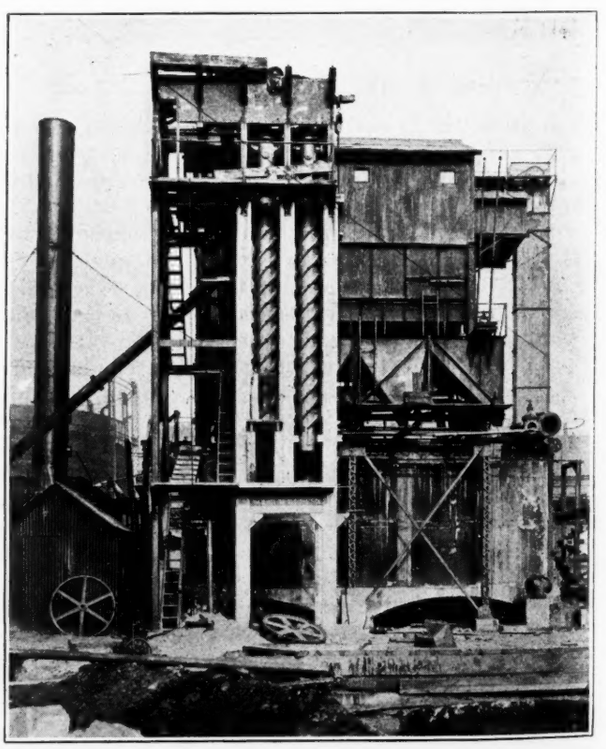
SPECIAL CORRESPONDENCE

SYNOPSIS — *Coal is now burned raw wastefully and inefficiently. The process here described reduces the amount of gas evolved by the usual processes of carbonizing and secures an increased output of oils. Fuel of any desired volatile content may be produced.*

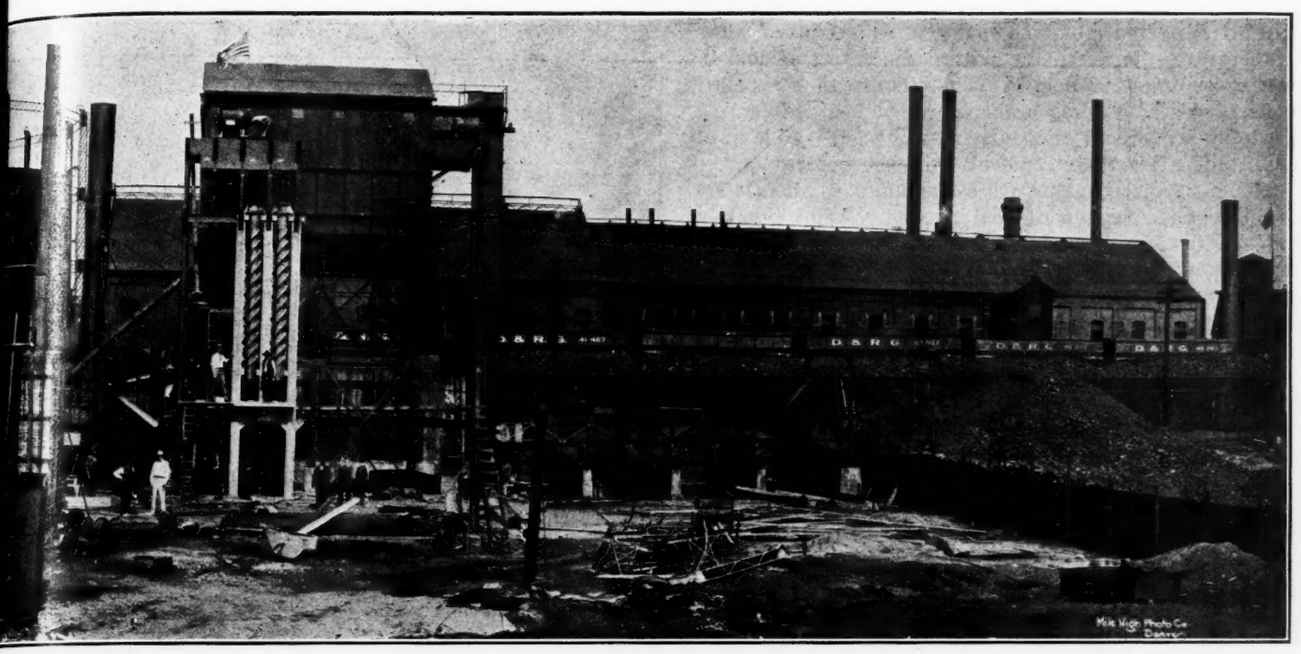
COAL in most instances is burned today just as it was when first discovered hundreds or thousands of years ago—that is, it is burned raw. In its natural or raw state bituminous coal burns under ordinary circumstances and manipulation with ease and inefficiency, with smoke and incompleteness. It is difficult, except by means of special furnaces and careful manipulation, to burn raw bituminous coal under a boiler smokelessly; in the ordinary house furnace or the kitchen range it is next to impossible. While smoke —that is, the emission of minute particles of solid carbon from burning coal—does not in itself constitute any appreciable loss, it usually forms a good indication that other and far more serious losses are occurring. Dense black smoke is the telltale of incomplete combustion.

That the burning of raw bituminous coal is an expensive luxury has long been recognized—and the more "bituminous" the coal the more expensive the luxury. In other words, it has long been known that high-volatile coal contained other products of greater value than its heat. These substances are extractable only by distillation. This distillation ordinarily yields a solid residual fuel or coke of low-volatile content, a large volume of gas, a small amount of ammonia and a variable quantity of oils and pitch. There are thus made two major fuels, one solid and one gaseous, both of which may be readily burned, giving complete combustion and no smoke.

The ordinary byproduct coke oven operates at high temperature and yields large volumes of gas together with comparatively small quantities of oils. As a re-



VIEW OF TWO RETORTS, WITH BRICK SETTING REMOVED



LANT IN THE WORLD, PRODUCING HIGH YIELDS OF AROMATIC TAR OILS AND SMOKELESS FUELS

sult this process of coking has found most favor where large quantities of gas are or may be consumed in industrial processes such as steel manufacture, or where existing density of population entails a demand for gas for domestic purposes.

Many experiments have been made in low-temperature distillation processes, but these heretofore have presented many difficulties, chief of which has been the length of time required for heat to penetrate any considerable thickness of a coal charge.

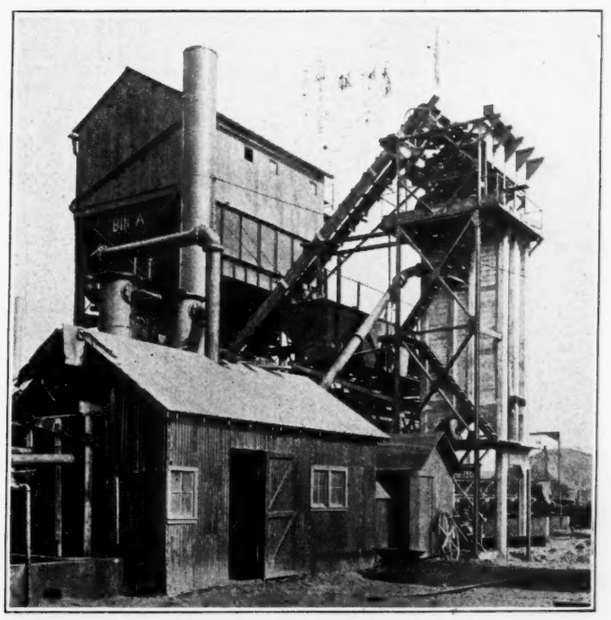
The Denver Coal Byproducts Co., of Denver, Colo., a subsidiary of the American Coal Byproducts Co., 115 Broadway, New York City, has had a low-temperature carbonizing plant in commercial operation for some time, and the results obtained are so significant as to be almost boundless in scope both as to utility and possible financial return. The plant is operated under the Greene-Laucks patents, or on what is known as the G-L process. This differs in many respects quite radically from previous attempts at low-temperature coal carbonization.

The retorts used are arranged in groups, units or batteries of four. They are made of cast iron, about 18 in. in diameter and 18 ft. long, and are set on end. A spiral fin is cast on the outer surface of each retort, which is incased in a firebrick setting. This fin serves a double purpose. It breaks up the currents in the ascending heating gases and materially assists in absorbing the heat therefrom and conveying it to the contents of the retort.

Coal, ground to pass a 20-mesh screen, is fed continuously into the top of the retort. Centrally mounted within the retort is a hollow-stemmed worm. This is revolved slowly by machinery and both agitates the coal charge and forces it downward, thus maintaining an operation which is automatic and continuous. Gas burners external to the retort but within the firebrick setting furnish the requisite amount of heat necessary for the carbonizing process.

As has been stated, the worm in the center of the retort is hollow. The gases evolved in carbonizing escape through suitable openings into the interior of this worm. At the upper end of the retort the worm shaft passes through a stuffing-box, then through the driving gear that actuates the worm, and its end is finally connected to a piping system in which a vacuum of approximately 24 in. is maintained.

Everyone knows that the less pressure maintained on water the lower is the boiling point. The same rule appears to apply to coal; or, in other words, the higher the vacuum that is maintained in the coking chamber the lower will be the temperature that will induce complete carbonization. In the G-L process, which is closely analogous to boiling in a vacuum, the gases, oils and



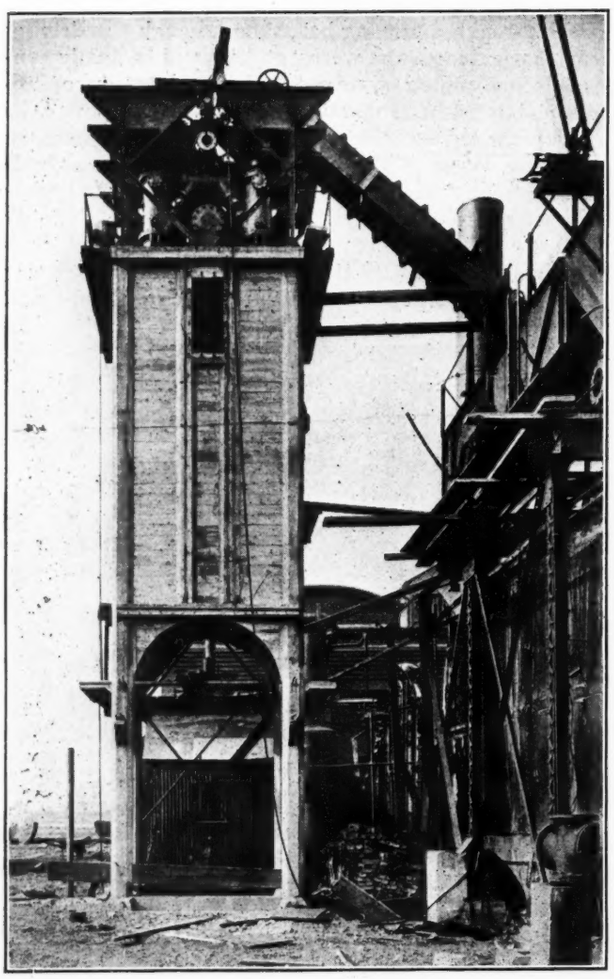
CRUSHING AND CHARGING PLANT, AND GROUP OF RETORTS

tars are liberated from the coal at a comparatively low temperature, the maximum within the retort seldom if ever exceeding 1200 deg. F. The oils are thus expelled as vapors without being broken down by heat into gases. Escaping as vapors they are readily condensible into liquid oils after their removal from the retort.

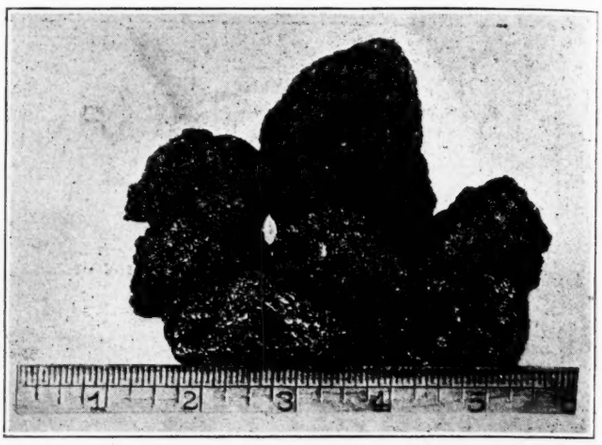
The gas evolved in this process amounts to about 4000 to 6000 cu.ft. per ton of coal treated. Approximately half of this is consumed in coking, leaving from 2000 to 3000 cu.ft. as an excess. This is high in calorific value, running about 700 B.t.u. per cubic foot.

The ammonium sulphate resulting from this process amounts to about 20 lb. per ton of coal treated. The amount of liquids extracted varies considerably with the kind of coal, a fair average for Colorado or Rocky Mountain varieties will show a yield of: Light oils, 3 gal.; carbolic oils, 6 gal.; creosote oils, 12 gal. Runs recently made at the Denver plant showed that 77 per cent. of the oils given off were what are termed aromatics—that is, they volatilize easily—while the creosote obtained was equal in quality to that secured from pine or pine tar.

This process of coking is continuous, with never more than 250 lb. of coal in any one retort at any one time. The capacity of each retort is about 25 tons of coal per 24-hour day, or 100 tons each 24 hours from each unit or battery of four retorts. The speed of the treatment is adjustable within limits permitting of a variation in the length of time that the coal within the retort is



SIDE VIEW OF A RETORT UNIT



DOMESTIC COKE MADE FROM LIGNITE

subjected to the action of the heat from without. The quality of the coke—that is, its volatile content—may thus be governed as requirements may dictate. It is thus possible to make either a metallurgical coke containing 2 per cent. volatile or a high-grade domestic fuel, one that is comparable to and that will behave almost exactly like anthracite, containing 10 per cent. volatile matter. The domestic fuel made by this process is of course lighter, volume for volume, than is anthracite coal. It ignites much more readily. Chemically the fuels are almost identical, and their actions in furnace or stove are exactly similar except that this fuel yields a fire somewhat more flexible—that is, one that will respond more quickly to a variation in drafting. Fuel of this kind made from western coals burns to a fine powdery white ash without the least suggestion of clinkering.

The cost of carbonizing by this process including labor, fixed charges, supplies, etc., is said to be about 50c. per ton of coal treated. The present market value of the products, considering the fuel as being worth $8 per ton and neglecting entirely the excess gas, but including oils, creosotes, ammonium sulphate, etc., is placed at $17.65 per ton of coal treated. The treatment thus reveals decided possibilities.

The installation at Denver, built originally as an experimental plant, has been in commercial operation for several months. Coals (carloads or more) have been tested from Utah, Wyoming, Colorado, Texas, Illinois and Ohio, while small samples from many other localities have been tried out in the laboratory. Oil shales have also been treated, showing results similar to those obtained from coal—that is, the recovery of high percentages of aromatic oils, or unsaturated hydrocarbons. No residual fuel is made from shale, however, the revenue from this treatment beginning and ending with the byproducts.

IT WAS LEARNED, during the construction of concrete ships, that hammering on the forms (by a mechanically operated hammer) produced a vibration which greatly assisted in settling the concrete and completely filling the forms. There is a tendency to use too wet a mixture when it is desired to have a concrete which will completely fill all space in forms, especially around steel reinforcing. Intelligently used, hammering on forms accomplishes the work of tamping with a concrete by no means wet and does the work better. However, concrete beginning to set should never be vibrated; also care should be used not to displace forms. It would seem that this method could be advantageously used in various kinds of concrete work.

Mental Equipment

WHEN considering the problem of new equipment, it is well to bear in mind that the mental equipment of an organization may also be studied with profit. In order to appreciate and desire new apparatus, it is obvious that the buyer must be mentally prepared with a vision and judgment sufficiently advanced to be in position to recognize the possibilities derivable from a change in a certain method of production. If a buyer is nonprogressive in ability, initiative and imagination, he naturally will be likewise in adopting new appliances for his plant. And it is just because there are so many people whose mental equipment disqualifies them from advancing beyond their present type of machinery that salesmen and sales literature must continually hammer at and besiege them.

Buyers as a rule have to be prevailed upon to install new equipment. This process is like hitching the wagon before the horse. The natural and Utopian way, of course, is no other than that of every buyer eagerly adopting on the moment the latest and most improved type of equipment in his line. This is as it should and would be were it not that the mental equipment of the buying public lags behind like a stubborn mule, and in turn places a checkrein upon inventive genius. Mechanical equipment is limited by the mental equipment of the prospective user.

The bituminous coal industry is a rich field for men who possess a mental equipment that is not content with merely keeping pace with competitors. Coal mining is influenced so widely by geographical and local conditions that the proper equipping of a mine is an individual problem and not a matter of duplication. Devices that may show excellent results in one mine may prove a disastrous experiment in another. Invariably the mechanical equipment is blamed in these instances, whereas it is the mental attitude of the purchaser that is at fault. Such mistakes could be avoided if buyers would familiarize themselves with the growth of improvements.

Necessarily this will not mean the adoption of every piece of new machinery placed upon the market. On the contrary, it will assist in an efficient selection of the practical from the chaff, and particularly in choosing new equipment that will be compatible with the physical conditions of any one mine. Mental equipment is as much a matter of knowing what new appliances to reject as what to buy. Not only this, but in order to be really efficient it should anticipate and demand better equipment, and not be satisfied to adopt new mechanical devices until after their worth has been fully proved by universal acceptance.

This kind of mental equipment is rare and invaluable, although there is no real reason why it should be unusual. Just as the progressive man, in order to keep abreast of the times, scans the daily newspapers for the latest news, so is it necessary that the trade papers be reviewed by the buyer if he wishes to keep in the foreground of his profession. The contents and advertising of the trade journals are the common meeting ground of the buyer and seller, and as such demand more than cursory attention. They supply and stimulate interest and investigation. Real information always has to be sought, seldom, if ever, coming via a golden spoon.

To be taken in conjunction with information—and quite as important—is the buyer's ability to use his imagination. Modern business has not yet fully recognized the great value of this ability, the faculty of looking ahead for any length of time. This is the privilege of individuals in planning their careers. Once in a great while, however, a man with imagination comes to the top in a large organization, and if he is not curbed, imbues and directs the business in such a spirit. To secure such mental equipment for an organization is as important as a careful consideration of the mechanical equipment. Neglecting the human element is a short-sighted policy.

Finishing the Job

In thinking of reasons for subscribing to the Victory Liberty Loan, let Americans who remained at home consider the case of Sergeant Burr.

He went out into the open, a slip of a lad, just elevated to his sergeantcy, on a hurry order to take his patrol inside the German line, and establish communications preparatory to the attack. And, finally, his voice came in youthful treble over the wire to headquarters.

In quick, jerky sentences he outlined his location, the lay of the land, the number of machine guns—eighteen—bristling directly ahead, and then he was ordered to leave one man at the post, and to seek cover.

After a long wait the same voice came trailing in over the hidden wire;

"Sergeant Burr speaking, Sir——."

"That kid again!" muttered the officer, and, aloud; "What's keeping you? You were ordered to get to cover and leave the wire in charge of ———.

"Yes, sir," interrupted Sergeant Burr, "I couldn't think of ordering any of my men to stay in such a place. I'm staying myself!"

Thus, out there under the French sky, Sergeant Burr of the A. E. F. carried on—in range of a dozen and a half machine guns, on a shell-swept terrain. He guards a bridgehead on the Rhine border today, the Distinguished Service Cross upon his heart.

Sergeant Burr is finishing his job! It is a very splendid and gallant way of finishing it. For his fellow citizens the obligation to finish the job must certainly be as binding! Our Victory Notes will make us all feel a little more qualified to welcome back the Sergeant Burrs of the American Army.

Steel Mine Ties

By R. B. Woodworth
Pittsburgh, Penn.

A SHORT time after it had been proved conclusively that steel was the most practical form of mine timbering, the use of steel for mine ties rapidly developed. During the years 1909 to 1917, the Carnegie Steel Co. sold 317,174 tons of steel cross ties, a large percentage of which were used in mines.

The steel tie is no longer an experiment. The success attending its use has established its superiority over the wooden tie. During the last few years their output has been restricted because of the difficulty of securing the steel, but a more normal stage is approaching, an age when steel will be plentiful and an age of reconstruction, when only the best equipped collieries can compete for the world trade demanding American coal.

The fundamental considerations on which the advantages of the steel tie over those of wood rest are the following:

1. *Headroom*—One of the most important features of the steel tie is the headroom gained through its use. These ties are only ½ in. in thickness, representing a gain of 2½ in. over the wooden tie. They are especially adapted for low beds of coal, permitting larger cars and heavier topping. No excavations are needed to lay the ties, and they can be spaced much farther apart as their shallow depth permits the track to rest on the ground. They are so light and compact that great numbers can be stored in a small space. Fig. 1 shows one of the stockrooms of the Majestic Coal and Coke Co., Duquoin, Ill., where hundreds of Carnegie steel mine ties are stored ready for instant use.

FIG. 1. UNDERGROUND STOREROOM FOR STEEL TIES

The following is an extract from a paper entitled "War Economies," by George B. Pryde, general superintendent of the Union Pacific Coal Co., read before the Rocky Mountain Coal Mining Institute at Colorado Springs, Sept. 5, 1918:

> The use of steel ties has been experimented with to some extent for several years, and these experiments have reached the stage where their use is recommended, especially in low seams. They are particularly adapted for this kind of work, for they provide a good rigid track and give greater headroom than the ordinary wooden tie, thus cutting down the taking up of bottom to provide sufficient height for haulage purposes. They are easily and quickly laid, and while they cost more than the wooden tie their longer life and adaptability as a labor saver recommend their more general use in mining low seams of coal.

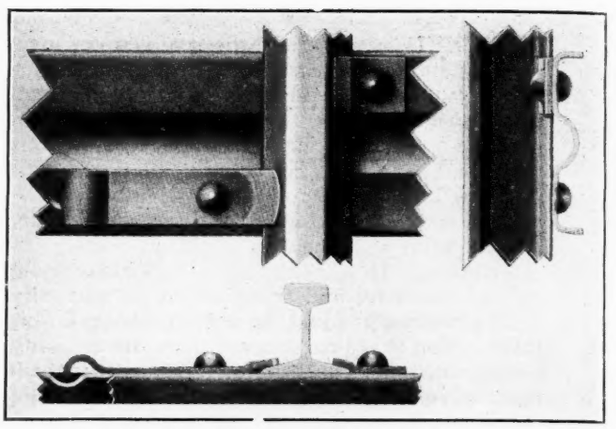


FIG. 2. TIE FOR GATHERING TRACKS IN MINES

2. *Endurance*—In mining it is frequently necessary that the track be exposed to excessive moisture, and that it be moved frequently. These have resulted in one of the most important advantages of the steel tie. The life of a wood tie under these conditions is short at best. Even when specially treated such ties can seldom be moved more than twice. On the other hand, steel ties under the same conditions give many times the service rendered by wood ties and can be moved repeatedly and easily. A few complaints have been made of their rapid corrosion when placed on damp floors, but this seems in no way to shorten their service. However, it can be easily overcome by a treatment in coal tar or asphaltum. Furthermore, when a sufficient quantity of such ties are desired, steel can be furnished with a certain admixture or alloy of copper, which has the effect of making the steel noncorrosive.

3. *Fire Risk*—The presence of wood in the mine always increases the possibility of fire and is a continual menace both to life and property. We can easily recall

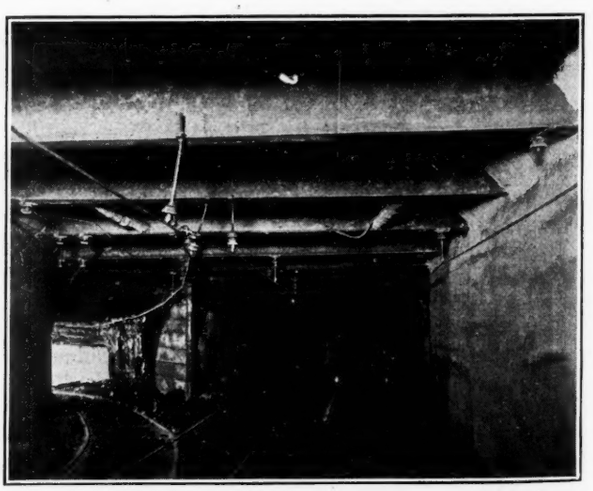


FIG. 3. STEEL CROSS TIES ARE REPLACING WOOD TIES IN THIS ENTRY

disastrous fires and the great toll of life taken thereby which would not have occurred had it not been for the large amount of combustible material present. The use of steel within the mines is fire insurance—an elimination of fire risk. Why should we not have fireproof construction below ground as well as above?

4. *Scrap Value*—At the end of their period of usefulness steel mine ties have a scrap value of approximately one-third their original cost. Wood after a short period of service in the mines has no value whatever, but becomes a continual menace to life and property. The first cost of steel is a trifle more than that of wood, but its longer and better service and its scrap value make it the more economical.

5. *Simplicity*—The design of steel mine ties is simple. The Carnegie steel mine tie, one type of which is shown in Fig. 2, is so constructed that one blow of the hammer firmly and rigidly holds the rail in place, and accurately to gage, preventing derailments and saving time. There are no loose bolts or fastenings, nothing to get lost, as these are part of the tie. One simple turn of the attached clip is all that is necessary. This

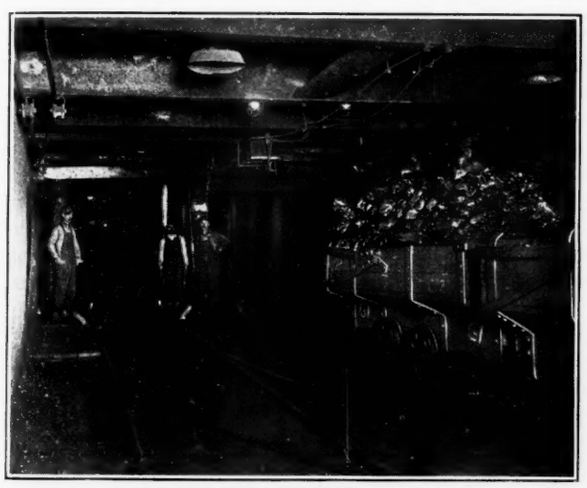


FIG. 4. SHAFT BOTTOM LAID WITH STEEL TIES

simplicity of construction and lightness make the use of steel ties a great economy in time, money and labor.

Considering the lateness of the use of steel cross ties for mining operations their utilization is widespread. The Union Pacific Coal Co. has installed steel mine ties in its mines located at Reliance, Superior, Hanna, Rock Springs and Cumberland, Wyo. They doubtless have had much to do with increasing the output of these mines, the total yearly production of which amounts to 3,600,000 tons of bituminous coal.

In Mine No. 9 of the Old Ben Coal Corporation at West Frankfort, Ill., both steel mine ties and steel timbers have been installed. As the average thickness of the bed is 8 ft. 6 in. these ties and timbers were not installed for the purpose of gaining headroom but because they have been demonstrated to be economical in every respect. The daily capacity of this mine averages 4500 to 5000 tons. This represents quite an increase over the output when wooden ties and timbers were employed.

Fig. 3 shows the main entry of Mine No. 9. About 1600 ft. of this entry has been timbered with steel I-beams resting on concrete walls. The roof has been lagged with wood. Steel cross ties are replacing the wood ties in the track. About four steel ties are now

FIG. 5. LOOKING TOWARD MAIN SHAFT IN ILLINOIS MINE

used per rail, and as the wooden ones decay they will gradually be replaced by steel.

Fig. 4 shows the shaft bottom of the south entry of this same mine. The shaft bottom is a highly strategic point at a high-production plant. Through it passes the tonnage of the mine. The capacity of the shaft is greatly increased by the facilities at and around the bottom itself. Conditions here have been wonderfully improved by the use of steel—a middle line of props has been eliminated by the use of steel timbers and much headroom is saved by steel ties, thus permitting larger cars with heavy loads.

The mine of the Majestic Coal and Coke Co., at Duquoin, Ill., is shown in Fig. 5, looking toward the main shaft. About 800 ft., of the entry is timbered with steel and the track is laid partly with steel and partly with wooden ties. Fig. 6 is a good illustration of the use of cross ties in low beds of coal. Their many advantages are obvious. The photograph was taken in the Wenonah mine of the Turkey Gap Coal and Coke Co., Wenonah, W. Va., where steel cross ties are used extensively. This company also uses the steel cross ties in its Modoc mine at Springton, W. Va. The Pocahontas Fuel Co., Inc., is using steel cross ties in the Jenkinjones mine, at Jenkinjones, W. Va., and in the Boissevain mine, Boissevain, Virginia.

In the 1918 mining catalog published by the Consolidated Keystone Publishing Co., Inc., page 466, is shown a comparison of installation and maintenance

FIG. 6. SHOWS USE OF CROSS TIES IN LOW BEDS

costs between wood ties and steel ties for room work in mines. The following is a summary:

Based on rooms 280 ft. long with steel ties spaced 4 ft. center to center and wood ties 2 ft. center to center, this estimate contemplates using each wood tie in two consecutive rooms and after the second year renewing annually 15 per cent. of steel ties, or ten new ties per year per room. The total cost at the end of life of first room for steel is $22.40; for wood, $19.60. The total cost at the end of life of second room for steel is $24.50; for wood, $28., or a saving of $3.50 when steel was used. The total cost at the end of life of third room for steel, $29; for wood, $47.60, or a saving of $18.60 in favor of steel. The total cost at the end of life of fourth room for steel, $33.50; for wood, $5[illegible], or a saving per room in favor of steel ties of $22.50.

The miners themselves prefer the steel ties because they entail much less work. If given their choice they will take steel any time. By using wood they are decreasing their production, as the time and labor involved in laying wooden ties is greater. Wood is becoming more and more difficult to secure, and the large sales and widespread adoption of steel ties are proving their utility.

Back Up Efficient Coal-Mining Apparatus with Efficient Office Equipment

By G. W. Laine, Jr.
New York City

After several years of intense wartime activity, a breathing spell is being experienced. This gives opportunity for a comparison of operation, under the pressing conditions of the past, with standard economical practice and the adjustment of certain factors that will lead to more efficient methods for the future.

It is highly essential for everyone interested in economical production and operation to study past conditions, for unless the lessons of the past are used as stepping stones, the pressure of competition and unforeseen circumstances ahead will be likely to cause difficulties.

During the pressure of war and the accompanying high prices, it was possible for many inefficient systems to be used without serious losses; but with readjustment there must be investigation of every means at our disposal that will promote economy of operation.

Many large concerns are reorganizing their departments, giving particular attention to their accounting work and making studies with the view of installing those mechanical aids best suited to such work. Not only is it necessary that consideration be given to efficient accounting equipment, but it is now realized by many that there is to be a more serious shortage of labor than was anticipated.

Unless the equipment for calculating and preparing data necessary to the operation of mines and other industries is secured, difficulty will be experienced in getting promptly, in suitable form, the vital facts essential to the maintenance and operation of a successful plant.

It is well that improved mine equipment is being studied at this time with a view to securing the most up-to-date devices and methods. Whatever equipment is considered, whatever is found to be most applicable, and whatever is adopted, there is all the more reason that the efficiency of operation, that the economy of mechanical appliances, should continue into the office where facts are compiled, where the records are kept and where the information necessary to the welfare of the whole organization is at hand for those who administer the affairs.

The efficiency of office equipment affects that of all other equipment. Machines may do good work in the mine, power distribution may be of the best, but unless the calculation of costs is efficient, the economy is not complete. Economy of operation also means economy in office methods. The days of paper and pencil for handling the "figure work" of the mill, the mine or the office are passed, and today machines are assuming part or all of the burden.

A careful investigation should be made of equipment of this kind, for when there are machines for adding and listing, machines for adding and upon which other calculations can also be performed, and also calculating machines which handle multiplication and division as easily as addition, and upon which subtraction can be performed directly, it is desirable to obtain the instrument that fills the need most completely.

The difference between the old methods of figuring and the modern calculating machines is so great that many opportunities where the old methods are employed exist for waste. Even the difference between machines is sufficient to cause enough loss to be appreciable.

No machine for handling figures is properly a calculating machine unless it will multiply, divide and subtract as readily and directly as it will add. These features are all available in the Monroe calculating machine which has many advantages in the preparation of the intricate data involved in coal-mine accounting.

Considering only the cost report required of bituminous coal production by the Federal Trade Commission so extensive is the work involved in computing the data required in the different subdivisions of the report, such as mining, ventilation, drainage, stripping, haulage, power, overhead, general expense, besides the various accounts and the cost figures which are necessary in the management of mines, that a considerable force must be maintained to handle this work. Intricate calculations are also necessary in the engineering department. Here the adding feature of calculating machines plays a much less important part, but the ability of a machine to extract square and cube roots is of great assistance.

It is remarkable the savings that may be accomplished by even one machine of this kind, and many concerns are adopting them in all departments because of their adaptability to all kinds of calculations. Some concerns

with this machine have reduced to hours work which formerly required days to perform. One which I have in mind, by using the Monroe 45 min. every morning, was able to prepare reports daily which formerly could not be pepared at greater frequency than once a week, but which were necessary to the quality of the product and were desired as often as possible.

One of the coal operators in western Pennsylvania says of the machines used in its offices, that "without a doubt the little machine is a valuable asset in any line where accurate figures are required; but on the A-1 sheets direct from the mine, where the tonnage is figured both gross and net, from pounds through the proper channels to final invoice totals, it is indispensable. Especially is this true since the Government requirements are so strict in regard to commissions and specific prices. Again, on the cost sheet—the most vital and necessary organ between mine and head office, and no doubt the most dreaded work of the payroll clerk, where the itemized distribution of cost is averaged to a final total—its accuracy and rapidity has cut the work more than 50 per cent. and pulled the thorn from previously abhorred and ofttimes neglected labor."

Just how these machines handle calculations will be interesting when such devices are being considered on their merits for handling the burden of figures. Perhaps the greatest saving is due to the absolute accuracy of the machine and the fact that because of a visible check it is not necessary to repeat any operation in order to have a positive proof of accuracy. There are only three simple parts to be considered in the operation of the Monroe machine. These consist of the keyboard and two dials; the upper dial having a capacity of 8 figures and the lower dial with 16 figures.

In a simple problem of multiplication, the figure to be multiplied is placed on the keyboard, where it remains until the work is finished. The number by which this is multiplied is turned into the upper dial by means of an operating crank at the side of the machine. This is easily turned and registers the figures of the multiplier in the upper dial. Simultaneously with the registration of the figure in the upper dial, the result of the multiplication of the factor on the keyboard by the number on the upper dial appears on the lower dial. The visibility of the three factors on the machine is sufficient proof that the result on the lower dial is correct.

The comparison might be made that writing the figure on the keyboard by depressing the keys requires approximately the same or less time than writing the number on paper. Writing the multiplier on the upper dial by turning the operating crank is approximately the same as writing the multiplier on paper. With paper and pencil, we are only ready to start multiplication, with the machine the result has already appeared on the lower dial.

Work involving the multiplication of large numbers, such for instance as those of six or seven digits, by numbers of six digits, which would require approximately 6 min. by paper and pencil without any assurance of accuracy—that is, multiplied but not checked—would require only about 45 sec. with this machine, and the machine results would be correct. This is a saving of over 88 per cent. in time, and if the comparison were made with pencil and paper work, including the time for verification, nearly 100 per cent. of the time would be saved.

To make a comparison in a different way, it might be stated with absolute veracity that the multiplication of seven digits by six digits would require ninety times as long by paper and pencil as with this machine, and we would not be sure of our results if accomplished by the long way.

Simplicity and accuracy are not the only features which make this device an economical factor in business arithmetic. The flexibility of the machine makes possible the continued multiplication of one factor by several others with much fewer operations than would be required for separate multiplications. If we have one number to be multiplied by several others, as would be the case in the distribution of a given amount over several accounts, according to percentages, we would set the constant factor, or the number to be multiplied, on the keyboard and turn the first multiplier into the upper dial. The product appears on the lower dial.

Now, in multiplying by the second number it is only necessary to change the number on the upper dial from the first multiplier to the second multiplier, and the result is changed accordingly. The number on the upper dial is changed from one number to another by forward or reverse rotation of the operating crank in the proper position; for example, if a number on the upper dial was 23 and we desired to multiply by 52, we would make one reverse turn of the crank in the units position, which would change the 3 to a 2, and then shift to the 10's position, and by three forward turns of the crank change the 2 to 5. We would then have the result on the lower dial as the product of the number on the keyboard by the number on the upper dial.

Results Can Be Determined Rapidly

In this way, no matter how many multiplications are to be performed of a given number by others, the results can be determined rapidly. It will readily be seen that in work of this kind a much larger percentage of the time can be saved than even in the case of multiplications, where different numbers are involved.

Addition is a simple process. The numbers to be added are set on the keyboard, and by a forward turn of the crank the number is added to that appearing on the lower dial, the keyboard being cleared with each stroke of the crank and made ready for the set-up of the next number.

Subtraction is equally as simple. The first number is turned into the lower dial by a forward turn of the crank, and the number to be subtracted is set on the keyboard and deducted from the figure in the lower dial by a reverse turn of the crank. It will be noticed that no mental work, whatever, is involved in these computations—it being merely necessary to place the figures on the keyboard and add them to those in the lower dial by a forward turn or subtract them by a reverse turn.

As division is merely a series of subtractions of the divisor or multiple of the divisor from the dividend or number to be divided, the process on this machine is no more complicated than any of the other operations. Reverse turns of the operating crank register red figures on the upper dial of the machine. Division is performed by turning the number to be divided into the lower dial and then setting the divisor on the keyboard. There are no complicated rules to learn, for the work is done in the same sequence as with paper and pencil.

Arithmetic as found in business, regardless of whether it is concerned with extending invoices, figur-

ing analyses of products, computing costs or solving complicated formulas involving square or cube roots, is after all only a combination of four simple processes —addition, subtraction, multiplication and division. The machine which will do these four things and save from 60 to 95 per cent. of the time and effort required by the usual processes is a benefactor to the cause of economy.

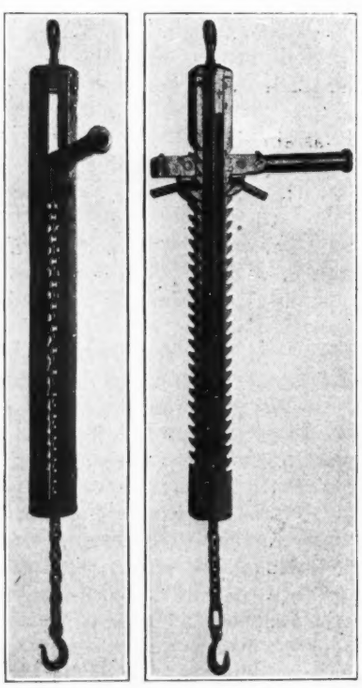
Because of the direct operating feature, the two-way mechanism, making possible addition and subtraction by simple forward or reverse turns of the crank, may be decidedly curtailed. For example, if it was desired to multiply by 98 it would only be necessary to multiply by 100, by a forward turn of the crank in the 100's position and two reverse turns of the crank in the units position; or in other words, to add the number 100 times and to subtract it twice.

No difficulty is experienced in understanding any of the operations or "shortcuts" on this machine, and anyone can operate it after a few minutes' instruction. This is a feature which should also be considered when investigating calculating-machine equipment, for if an experienced operator is necessary, much depends on the capability of the operator and also on his attention and goodwill.

The last, but one of the most important factors governing the selection of equipment to facilitate economical operation, should be its durability, the repairs which may be necessary and the costs and delays incidental to any trouble which may develop. The construction of the Monroe and the service departments available without charge to the user are in keeping with the standards of the organization of its manufacturer.

Universal Lifting and Pulling Jack

The Elk Engineering Works, of St. Mary's Penn., is placing on the market what it has termed the "Universal lifting and pulling jack." This is shown in the accompanying illustration. The body of the device is built of steel angles with malleable iron end pieces. The hook at the upper end is drop-forged. The chain travel is equal to 3 ft., and a movement of the lever either up or down causes a pulling action on the chain. There are no gears or attachments, and the entire device weighs 70 lb. It is well adapted for moving mine timber or for other work where a powerful pulling or lifting apparatus is desired. Its simplicity and ease of operation will appeal to mining men.

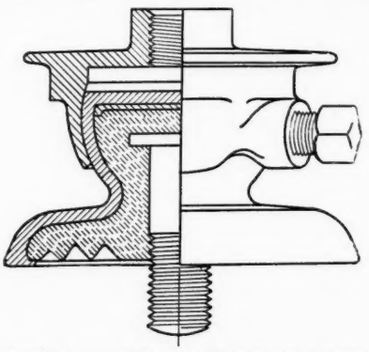


POWERFUL PULLING JACK

New Hanger Aligns and Plumbs Trolley Wire

Every man who has strung trolley wire in a mine knows the difficulty of keeping the trolley wire free from kinks at every suspension point. The Ohio Brass Co. has now produced a trolley hanger (Types SH and SK) which overcomes this difficulty.

The insulating member of the Type S hanger has a half ball top over which is clinched the socket casting. Although the two pieces cannot become separated the lower half of the hanger is free to turn or be tilted in any direction after the hanger has been attached to the roof or timber.



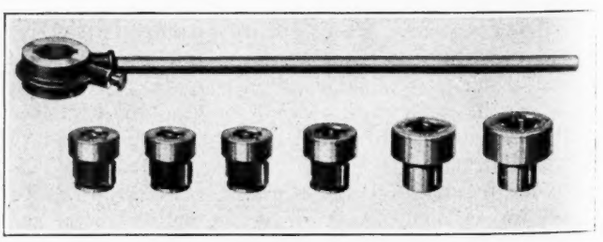
THIS HANGER KEEPS WIRE FREE FROM KINKS

With the set screw loose, the hanger is screwed on the expansion bolt or lagged to the timber. The clamp is then tightened on wire and hanger. The lower part of the hanger is twisted and rotated until the wire is true and straight. Each of the three set screws is turned up, which makes a rigid unit of the suspension.

Types SH and SK are identical in principle. The SH is designed for lagging to timber, while the SK is screwed onto an expansion bolt driven into the roof.

New Ratchet Pipe Threader

The Borden Co., of Warren, Ohio, has placed on the market a new pipe-threading tool known as the No. 3 Beaver, Jr. This is a ratchet tool with various sizes of cutting heads, these heads being made for pipe from ⅛ to 1 in. in diameter. The ratcheting feature of this tool is one of importance. It permits the threading of pipe in places that would otherwise be inaccessible, such as in narrow trenches or ditches, between the studding or rafters of buildings, or in cramped quarters generally. Of course, the ratchet does not prevent the tool from being used like an ordinary pipe threader at the bench vise. Even here the ratcheting device has its advantages, since it permits the operator to move the lever through the arc that is most convenient.



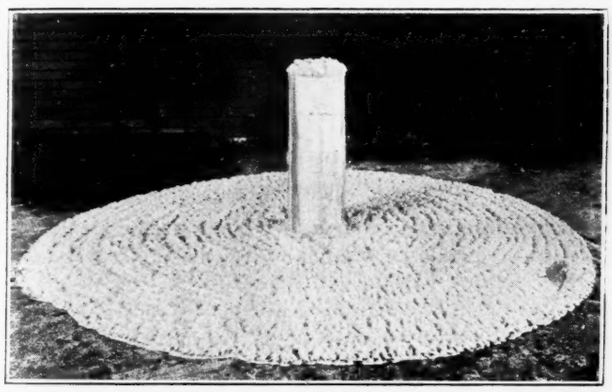
RATCHET TOOL WITH VARIOUS SIZES OF CUTTERS

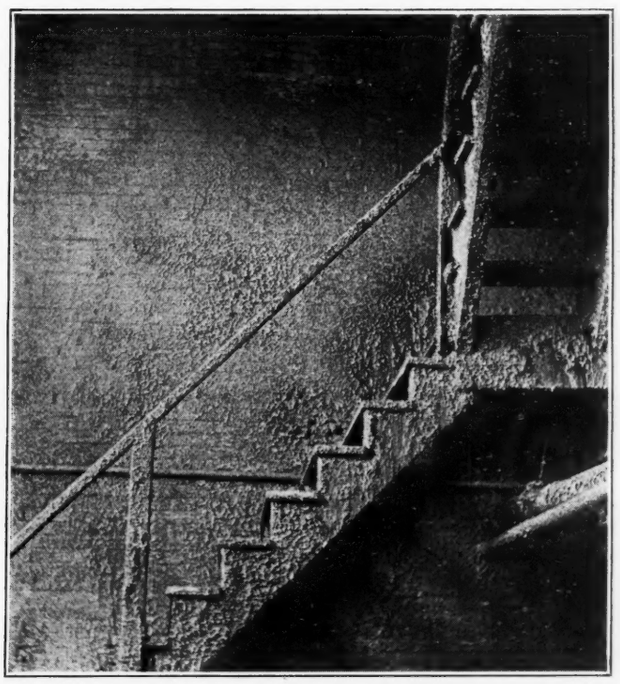
Firefoam Extinguishers

The ordinary means of extinguishing a fire is to isolate it from its supply of oxygen or cool the fuel below the combustion temperature. As a general rule this isolation or cooling is accomplished by a coating of water. When water is thrown upon a fire it forms a thin film over the surface of combustible material, excluding the atmospheric oxygen. This cools and extinguishes the fire. A similar result may be accomplished by an inert gas—that is, one that will not support combustion—such as carbon dioxide.

One of the chief difficulties experienced with the ordinary so-called chemical extinguisher is that the gas evolved, although heavier than air, is soon dissipated either by diffusion, by air currents or both. The full quenching effect of the nonsupporter of combustion is thus either lost or is at best only temporary.

In order to overcome this difficulty the Foamite Firefoam Co. has developed and placed upon the market an extinguisher that in outward appearance is similar to ordinary chemical extiguishers, but which possesses different qualities when in action. The chemicals employed in this device generate roughly eight times their volume of carbon dioxide gas and imprison this gas within a vast number of minute bubbles. The nonsupporter of combustion is thus confined in a thick blanket of lather tough enough to last for several hours, and one that will adhere tenaciously to any surface that it strikes.





THE FIRE-SMOTHERING "PANCAKE" THAT RESULTS WHEN THE CHEMICALS ARE MIXED IN AN OPEN CONTAINER, AND A STAIRCASE THAT WAS SAVED FROM FIRE BY AN APPLICATION OF THE MIXTURE

The two liquids employed are held in separate compartments of the container and are not mingled until ejected from the nozzle of the hose. Once mingled they promptly react upon each other, forming carbon dioxide. One of the illustrations shows the effect of mixing the chemicals in a can and allowing the resulting spume to run over the top. A "pancake" of fire-smothering carbon-dioxide lather is the result.

Another illustration shows a stairway that was drenched with gasoline. This was then set on fire and extinguished with one of these extinguishers. The resultant fire-smothering blanket may plainly be seen coating the surfaces of the stairway and brick wall back of it.

This coating, as has been said, is sufficiently tenacious to remain in place for a long time. If it is desired to remove it from the surfaces coated before it is dry, this may be done by sweeping or by shoveling if the thickness is great enough to warrant this method. It eventually dries to a fine white powder that may be readily swept from building surfaces with a broom or brushed from clothing with an ordinary clothes brush.

This fire-fighting apparatus is now manufactured in sizes ranging from a 3-gal. fire pail and a 2½-gal. hand extinguisher up to 500 and 800 gal. engines mounted on wheels, skids or trucks. Special apparatus or engines of special design or size may also be built. This means of fire protection possesses one peculiar advantage—it may be rated and installed upon a strictly scientific or engineering basis. If a given surface area is to be protected the amount of chemicals necessary therefor may be calculated with exactitude.

This method of arresting combustion, although applicable to any fire, is particularly effective in combating fires in oil tanks, reservoirs or storage places where water (on account of its greater specific gravity) would be useless. Some of the largest of oil tank fires have been promptly extinguished by this means.

For work inside the mine it seems to possess great possibilities, in that the extinguishing gases are permanently held in the retaining bubble blanket and cannot readily diffuse and foul the air.

Increasing Use of Gate Valves

Gate valves are finding increasing favor among mining men, and for certain classes of work are taking the place formerly held by globe valves entirely. For water lines they give a quick, sure opening which is not so likely to clog as is the case when the globe valve seat is to be passed. For slushing work where the water is of high acid strength, an iron body valve, extra heavy type, with brass gate is used. On breaker, shaker and loading gallery lines a wood-lined iron body gate valve of special design, the patent of Isaac Beaver, is giving long-time service. Some foremen are inclined to use gate valves for steam lines also, but the number thus employed is small. The "ground seat" valves still have the preference for this kind of work at present.

Overstocked Condition of Coal Market Does Not Make for Maximum Output

Stocks of bituminous coal, as displayed by the survey recently completed by the Fuel Administration, and which is given on page 839 of this issue, are larger than was generally supposed, and it is the opinion of officials having to do with coal that no important increase in production will take place before August. Even then it is predicted that production will climb only slowly. The stimulation to production which usually comes in August is due to a considerable extent to the fact that the Lakes are in a position to handle maximum tonnage. Owing to the large stocks in the Northwest, it is anticipated that this stimulation to increased output will not be so great this year as has been the case formerly.

Rumors of contracts being made at low prices continue to reach Washington, but the unsettling effect of such rumors are expected to be discounted to a considerable extent by the publicity which now is to be given contracts for railroad fuel. At the request of J. D. A. Morrow, general secretary of the National Coal Association, the Director General of Railroads has sent out instructions that the publicity is to cover current orders as well as contracts.

Whether the situation is to be aided by the Industrial Board of the Department of Commerce probably will be decided in the near future. Secretary Redfield has put the issue squarely up to Director General Hines and has indicated that the board will be dissolved at once if Mr. Hines will not give it his support.

In a report on the business situation issued by the Committee on Statistics and Standards of the Chamber of Commerce of the United States, the following reference is made to coal:

"There has been a failing off in the demand for coal and a consequent decrease in production. Last fall bituminous coal was produced at the rate of twelve million tons per month. Today it is seven million tons. The mild weather and early spring also were factors in decreased demand. Mines are running from three to four days a week.

In normal times there is always a slackening in demand but during the war production was at the maximum all the time and the present slackening is more in evidence than normally. Prices have not varied since the restrictions were removed. High grades have increased slightly and low grades have fallen off. The coal operators have shown reluctance to reduce prices. There is a heavy export demand but ships cannot be had to move coal wanted abroad. Production of anthracite coal is about normal."

Railroad Administration To Take Over Coal Traffic Bureaus

It now is practically certain that the Illinois-Indiana and Ohio coal traffic bureaus will be taken over by the Railroad Administration. These bureaus formerly were conducted by the railroads to gather coal statistics and were turned over to the Fuel Administration. The Fuel Administration soon will be a thing of the past, and some apprehension has been felt as to the future of these bureaus. It is understood, however, that the Railroad Administration has been impressed with their value and that they will be permitted to go ahead with their work without any interruption.

Coming Annual Convention of National Coal Association

Every effort is being made by the National Coal Association to make its annual convention of more than average service to the coal operators of the country. The meeting is to be held in Chicago, May 21, 22 and 23. Since there is an unusual number of uncertainties besetting the coal trade at this time, it is believed the exchange of ideas at this meeting will be of more than ordinary value. Work on the program has not been completed, but Dr. H. A. Garfield, the Federal Fuel Administrator, and other prominent figures having to do with the coal industry will be heard.

Several important amendments to the Association's charter will be voted upon. Officers and members of the board of directors will be chosen for next year. The members of the board will recommend that J. D. A. Morrow, now the general secretary of the Association, be made a vice president. Mr. Morrow will continue to direct the activities of the Association. Since his duties largely are executive, and not secretarial, it is the idea of the board of directors to authorize the selection of a secretary who can relieve Mr. Morrow of some of the secretarial details.

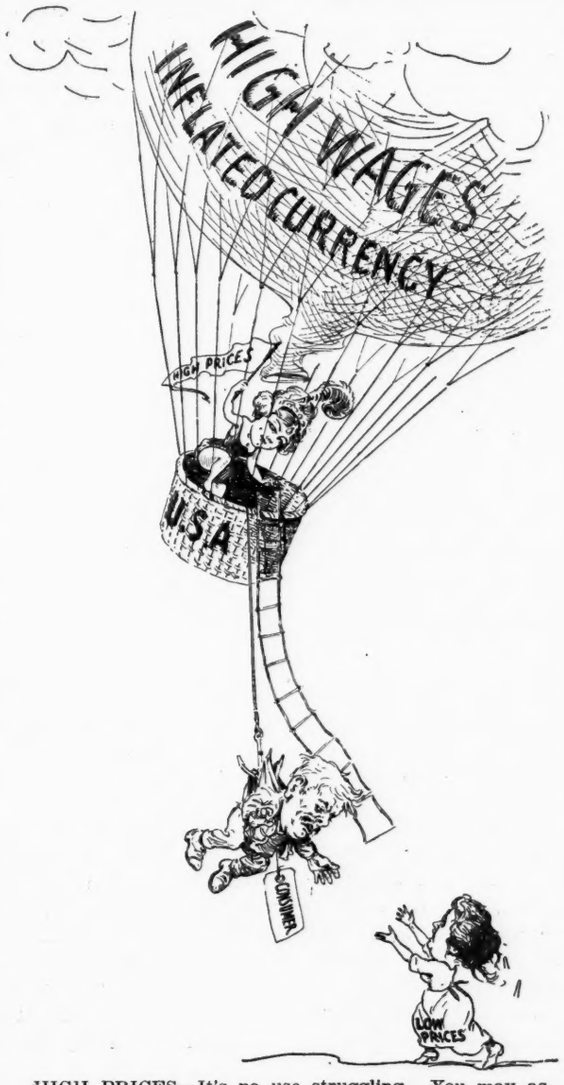
Advantage will be taken of the gathering of so many coal operators to demonstrate at the convention the details of the work of the open-price trade bureaus.

The coal division of the Geological Survey is much gratified as a result of the success of its plan wherein the local trade associations submit statistics. While the data from these sources are not so complete as are those furnished during the war by the district representatives of the Fuel Administration, it is certain that no other plan could be devised to secure such information without large appropriations being available.

EDITORIALS

At Least One Commodity Is Cheaper—Money

SPEAKING generally wages have not risen appreciably when measured in the goods for which wages are exchangeable. They cannot rise figured in goods, because there is only a certain amount of goods in the world to divide. The prices of any given goods have not increased much when measured in the commodities for which the goods in question may be exchanged. Some wages measured in goods are a little higher than they ought to be. Some prices measured by the prices of other goods would have to be lowered to produce perfect justice. But on the whole, goods are goods, and the price of all of them cannot be too high as measured in terms of one another. Wages are really nothing but goods; they can only be made high by a plethora of goods; they can only be made low by a scarcity of product. They are only high in comparison with money. We can always increase the quantity of money, and make wages and prices rise proportionately to the quantity of money in circulation. But the goods will only *appear* to be dearer and the wages will only *appear* to be higher. It is not dollars we work for; we labor for goods or for the power to buy goods when we will, and goods are none too plentiful just now. So high prices and high wages do not help or hinder us, unless the changes in price and wages are unequally distributed. That is usually the case when there is a readjustment of these items. Some persons profit and other persons suffer. The profiting of one and the losing of another, the bettering of John and the injuring of Jack, balance each other. The only safe bet is in large production. That is a joy that we can experience without having a headache in the morning.



HIGH PRICES—It's no use struggling. You may as well go up with the basket, for with high wages and inflated currency in the balloon it can't do otherwise than ascend.

They tell the story of a farmer who complained that he had been charged too much for a buggy. He had bought one some years before, and he remembered that it did not cost anything like as much as the new one. The hardware merchant looked up his old accounts and found that the farmer had not paid for the first buggy in money but in wheat. So he wrote to the farmer and told him he would refund him his money, let him keep the new buggy, deliver him a good piece of household furniture and a good kitchen stove if only the farmer would bring him as many bushels of wheat as he delivered to him for the first buggy. The buggy was cheap, not dear, as measured in commodities. Like the farmer we need to learn that prices are *not* high in commodity values while all commodities *are* high as compared with money. The unions and the Government printing presses of the world have made money low in commodity value. There is no hope that the prices in the United States will go down while the unions hold their own and the volume of currency remains unchanged or even increases (for bonds are still being sold) so what is the use of waiting for low prices? We shall see higher prices before very long.

Somehow the public believes itself independent of a little item like inflated currency. It is ready to believe that its own psychological condition, its own thoughts about the prospects of business cannot be changed; but it holds that the inflation of the currency can be overlooked if only one will squint really hard or hold a hand over one eye. The public is partly right, however. The inflation of the currency can be in a degree minimized. For instance, in India there has been at all times a wonderful absorption of silver money. The people make it into ornaments. In America there has been an influx of gold and an increase in credit instruments (as for instance Liberty Bonds). They don't depress the value of the dollar as much as they well might, having in consideration their overwhelming volume. The reason is because the people are not circulating either, as freely as they might, nor as freely as they will when prosperous times come, when every one will seek to make the most of coin and credit.

Low-Temperature Carbonization

WE PRINT on page 810 of this issue a description of the low-temperature coal-carbonization process employed by the Denver Coal Byproducts Co., of Denver, Colo. This process, known as the Greene-Laucks, or G-L, has, we are informed, attained no small measure of commercial success.

Coal Age holds no brief for the Greene-Laucks or any other coal-carbonizing process that was ever conceived or perfected. It would appear, however, that the time is now ripe to make all possible improvements in our methods of abstracting the benefits contained in nature's storehouse of energy. The farmer who under any but exceptional circumstances would feed unthreshed wheat into the furnace of his straw-burning boiler would rightly be considered foolish. Yet American industry annually feeds millions and hundreds of millions of tons of raw coal into its furnaces, fully aware meanwhile that this coal contains byproducts of much greater value than the heat liberated by its combustion.

This yearly waste is a sin rather of omission than of commission. In the past coal has been coal; it has meant to the public, at least, only heat and the comfort that may result from or be induced by it. The perfection and commercial application of some means for abstracting the valuable byproducts from raw coal before it is burned will be welcomed by heat-users generally. Especially will this be the case if the resulting solid fuel will be more efficient in use than the substance from which it is made.

The McGraw-Hill Co. is expressing its unqualified faith in the correctness of its prognostications that prices will increase or at least remain at the present level by adding a story to its present structure. It desires to complete the work before wages and prices are higher and before labor and materials are hard to obtain.

What Is Wrong with Anthracite Pea Coal?

PEA coal is a drug on the domestic market, and operators are realizing that the situation is fast becoming serious. All the other sizes of anthracite are absorbed as quickly as they are produced, with many orders for stove coal going unfilled, but pea coal continues to accumulate. Probably the lack of demand for this size is more troublesome to the independent operators, who because they have no storage facilities for the accommodation of their surplus output are confronted with heavy demurrage bills on the coal before it can be moved from the mines. As a result much of it is usually sold at a loss. Of course, it is possible for the larger companies to run their surplus into storage yards; but this proves to be an expensive proceeding, as the cost for the extra handling to and from the yard mounts up rapidly.

There are two main reasons for the existence of the present condition. First, the operators themselves have spoiled, if not ruined, the pea-coal market by shipping during the past two years a size that more nearly resembled buckwheat than pea. Of course, it may be said that during the war they were encouraged by the fuel authorities to increase the percentage of buckwheat, but now that the war is over the operators should at least size the coal on the pre-war basis. Dealers report that their trade will simply not have the coal in its present condition. The operators spent much time in building up a domestic trade on pea coal, as for many years it was considered nothing more than a steam size and was sold at a low price for that purpose. In order to take up the surplus production of this size a domestic trade was built up in the eastern market.

The second reason for the objections coming from consumers is that the difference in price between pea and nut, the next larger size, is so small that the consumer, from the standpoint of economy alone, is coming more and more to prefer the larger size.

The market is rapidly approaching a break on pea coal, and the dealers are holding off in the anticipation of being able to procure this coal for storage at a much lower price than now prevails. Inasmuch as the mines cannot operate without producing this size, it would seem that the wisest course for the operators to pursue would be to reduce the price of pea coal from $4.80 to, say, $4.20 per ton, which would establish a ratio of $2 between that size and nut coal, and thus make it more attractive to the consumer. We know that the operators have been viewing the pea-coal situation with much alarm, and it would not be at all surprising if some action were taken soon; but at the same time the operators should see to it that the old-time preparation, so far as size is concerned, is restored.

Price reductionists have delayed house construction so that it is doubtful whether this winter we will have shelter for the public and schools for our scholars. "He kept us out of excess prices" is a slogan like "He kept us out of war." We pay for it sooner or later. When we pay we pay double for the delay.

Were They Fools or Wise?

TOO MUCH has been said of the services of labor and capital during the World War. No sacrifice of effort and of resources can compare with the sacrifices—financial as well as personal—of those who fought for a dollar a day and, while risking their lives, also during the period of conflict, surrendered their chances to lay by a competence for old age and wedded responsibilities. Labor and capital have again an opportunity in the Fifth Loan to prove that the war in a degree was won not alone by the heroic soldiers, but by the provident sacrifice of those who stayed at home. By refusing to place on the altar a money sacrifice to meet the greater offering that our boys so unhesitatingly made, we are in effect saying that they were fools to surrender so much for liberty and justice.

A living wage cannot be guaranteed. One might as well determine arbitrarily how much an acre of ground should produce by inquiring how much the owner of the land needs to get from it in order to make a living. Given, however, efficiency of labor and capital and steady work, there is absolute assurance that a living wage and more than a living wage for every normal person can be obtained even without guarantees. What the worker really wants is not as much as will enable him to live, but as much as he can earn.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

In the anthracite region the old pressure to induce the mine workers to work on holidays and holy days is being resumed. Naturally the men resent it after a period of idleness and colliery closing. The operators will, of course, receive what blame is to be borne, though the really guilty party is the buyer of coal. He talked lower price and waited for it and at the last moment put in his orders.

He has a righteous indignation that the orders are not filled as soon as filed. He cannot see why he should pay the extra dime, seeing that his order was put in before the increased price went into effect. The very purpose of the differential is to spread buying and to promote a steadying of the labor demand. Why should he expect that a delayed order should be given the concession granted to one delivered more promptly?

If there had been no advantage this year in placing the order before Apr. 30 all the orders would have come in on that date, and the mine workers would have been idle throughout the month of April except where some individual might have been compelled to buy coal to finish out the winter. The differential is of value only as it serves to maintain steady work, and it should always be interpreted so as to promote that result.

WHY SHORTEN HOURS WHEN ORDERS ARE UNFILLED?

The rush of orders, let us hope, will end, in the anthracite region, the agitation for shorter days and shorter weeks. The plan never had any applicability to the anthracite region, where, working steadily, it is barely possible to get out the coal the nation demands. It is to be expected that soon a rush will begin in the bituminous region also, for the slow time worked hitherto makes the possibility of future activity quite bright.

The Philadelphia & Reading Coal and Iron Co. has notified the miners that, as serious accidents have arisen from gas being set off by smokers, no smoking in their mines will be allowed.

A number of apprentice boys and several machinists employed in the Drifton shops of the Lehigh Valley Coal Co. were recently "suspended indefinitely" for their part in organizing a shop union.

At the mines of the Potter Coal Co., Coral, Indiana County, Pennsylvania, the mine workers have been on strike for some time to enforce the recognition of the union, despite the fact that the wages in effect at the Potter Coal Co.'s mines are higher than union wages.

MILITIA QUELLING MINE RIOT AT LINTON, IND.

On Apr. 28 the authorities of Linton, Greene County, Indiana, appealed to the Governor for troops to quell a riot said to have been the outcome of a strike of workers at that place. He dispatched one company of militia. Another company is being mobilized at Terre Haute for similar service.

The strike of the coal workers in Kansas, Arkansas and Oklahoma fields was extended by Alexander Howat, president of District No. 14, into Missouri, on Apr. 18, when that labor leader declared a strike in the mine of the Liberty Coal Co. at Appleton City, Mo. About 6000 men are now involved.

The mine workers in Nova Scotia were to vote on the five-day week on Apr. 22. The result of the vote is not yet known. The executive board voted $500 for the relief of unemployed mine workers in Cumberland, where three mines are closed down. The board also passed a resolution at the Glace Bay meeting calling on the Federal Government of Canada to provide ships to replace those commandeered for the use of Great Britain. According to the mine leaders Great Britain has 20 or 30 coal carriers built by the Canadian Government. The use of these ships by the British Shipping Board interferes with the shipment of coal from Nova Scotia. The board advocates the payment of subsidies to Canadian shipping interests engaged in such coal trade, if that be necessary to reëstablish the St. Lawrence market or to transport the coal to New England or South America.

The mine workers of Nova Scotia are not yet members of the United Mine Workers of America but the transfer from the Amalgamated Mine Workers of Nova Scotia to the international union will soon be effected. The New Brunswick mine workers have also applied for permission to join the United Mine Workers of America. It is expected that Nova Scotia and New Brunswick will form together District No. 26.

In Upper Silesia the mine workers have decided, as a result of the prerogatives given them, to oust a half a dozen of the managers and directors of some of the largest Silesian mines. Among those thus summarily removed are Herr Vogl, one of Germany's wealthiest men. He is a director of Prince Henkel Bon Donnermark's properties.

Anthracite Region—"Full Speed Ahead"

Mine managers in the anthracite region are much concerned over the coming labor shortage. Many foreigners are planning to return to Europe. The conditions obtaining in the mother countries seem in no way to abate their ardor to return. The departure of these men from the anthracite region will result in a shortage of inside labor next winter when labor is usually extremely hard to get.

Nearly all the collieries of the Lehigh region were idle on Good Friday and Easter Monday. The Lehigh Valley Coal Co., which has just resumed a full-time schedule, requested their men to work on the Easter holidays, but the request was unheeded.

Short Strike at Vesta Coal Co's Mines

Some time ago the miners at Vesta Mine No. 5, Vestaburg, Washington County, Pennsylvania, went out on strike, the ostensible reason being that a one-legged man was refused a house. He had lost his leg in the employ of the company, had received compensation, had left the employment of the company, and accepted a job elsewhere. When he returned, he thought he was entitled to rent a house of the company. In that field houses are very scarce, and persons may consider themselves fortunate if they are able to secure a passable good boarding place, a private house not being procurable. Besides this reason a number of other reasons were given for excluding him. Probably the real reason was the strength of Bolshevism among the Russian miners at that mine. They are very active and not as well educated as they might be. Many of them really believed that the time had arrived for them to take over the active working of the mine. However the trouble was amicably settled, and the men returned to work.

When pay day arrived their statements showed that they were fined a dollar a day for each day they were on strike, or four dollars each. All the mines of the company then went on a sympathy strike for the return of the four dollars which each man had been fined.

They did this against the direct warning of the district officers of the union. After staying out about ten days they voted to return to work. Neither the district officers, nor the international would support the strike. They openly declared that the men were in the wrong. The strikers concluded they did not want to fight the district, the inter-

national officers of the United Mine Workers of America, as well as the coal company, and they went back to work.

It was unofficially stated that the men who went out on the sympathy strike would be fined only two dollars, as that was all the mines would have worked in the religious season during which the strike occurred. The conservative, and English-speaking miners were opposed to the strike from the start, but were outvoted by the foreigners. The company had plenty of coal in stock, the miners wanted a holiday, the strike has been amicably settled, so probably everybody is well satisfied.

Struck to Have Two Men Ousted

About 100 miners employed in the mines at Kaymoor, in the New River field, Fayette County, West Virginia, were on strike for a few days last week, quitting work when the company by whom they are employed refused to discharge two of their fellow workers, whose discharge the miners insisted upon. Not deeming there was sufficient cause for the discharge of the two employees, the company refused to accede to the request for their discharge. After being out on strike for a few days the miners were ordered back to work by international officials of the United Mine Workers' organization.

Bower, W. Va., Field Is Organized

The Bower field in Braxton County, West Virginia, has been organized by the United Mine Workers of America and will be included within the jurisdiction of District No. 17, of which F. C. Keeney is president and Fred Mooney, secretary. Locals have been organized in this field at Bower, Copen, and Copen Creek by Board Member Nick Aeill. A wage scale has been agreed upon and contracts between the companies and the mine workers have been signed. The mines at Copen and Bower are operated by the West Virginia Coal & Coke Company. The Bower field is on the Coal and Coke Railroad and is sometimes placed in the Fairmont field. It lies about midway between Charleston and Fairmont.

The union made an effort during the summer of 1917 to organize all the mines in that field, but the coal companies which were operating the mines in that region at that time resisted the efforts of the organization. At one point in the field several shooting affrays occurred, and for a time bad blood existed between the organization officials and those of the company, it being necessary to call out three members of the special deputy sheriff's force to preserve order. The story printed a few days ago in a labor paper to the effect that the first attempt to organize the field was a failure because of the interference of state guards is wholly untrue, as the state police were at all times neutral.

Unwilling To Hear Unsubstantiated Claims

Further hearings have been held in the New River field by Judge Allison O. Smith, representing the United States Fuel Administration, for the purpose of adjudicating claims made by a large number of mine workers in connection with the advance of $1.40 allowed to monthly men. The hearings were held by Judge Smith at Stamford on Apr. 7 and 8. In all there were about 66 cases for Judge Smith to settle when the hearing commenced.

Even Mine Workers' Commissioner Dwyer, representing the operators, declares that a large number of mine workers have filed claims for back pay without first comprehending the terms of the advance and that consequently there is no ground for some of the claims, but nevertheless it has been necessary to look into all of them.

However, in order to expedite further consideration of claims, Umpire Smith has directed Commissioner T. L. Lewis, representing the operators, and Commissioner Dwyer, representing the miners, to investigate all claims in the New River and Winding Gulf districts not heretofore adjudicated, submitting to him only such claims as cannot otherwise be agreed upon.

Miners Insist on Fair Coal Prices

Declaring that the wages of the miner are too low and that a cut in the price of coal at the present time would further affect the wage scale, the executive board of District 11, United Mine Workers of America, has taken steps to oppose the reduction of the price of coal to railroads, and a letter announcing the board's stand has been sent to W. D. Hines, director general of railroads. The board declared that a reduction to railroads would prompt the public to ask also for lower rates, which, it is said, would affect the miners' pay.

A joint statement was made by President Ed Stewart and Secretary William Mitch of the board, as follows:

"At the board meeting, the question of the reduction in the price of coal to the Railroad Administration was brought before that body. A stand was taken that this board would oppose a reduction in the price of coal brought by the railroads, and a letter announcing this was sent to Director General Hines.

"The wage scale of the miners is absolutely too low. If the railroads get a reduction in the price of coal the public will be prompted to ask for a lower price than the operators are in a position to give. If a lower rate is granted, it would mean that the miner would suffer. By this, it should not be taken to mean that the miners are encouraging profiteering. They favor only a fair price for coal, but it is a fact that many mines are merely breaking even and not making a profit."

The mine workers are determined that fair prices shall be conceded to the operators, for they well know that there is no advantage to them to deal with a bankrupt, or near bankrupt, concern. Such a corporation must inevitably take risks in the safety and treatment of its employees or go out of business. The mine worker recently has been noting that his union is formed not so much to deal with the operator as with the consumer. He is beginning to realize and acknowledge that his interests are identical with those of the operator. In consequence a new alignment is insensibly forming.

Miners Question "One Big Canadian Union"

At a recent labor convention held at Calgary, Alberta, the approval of that province was registered in favor of the proposal that Canadian workmen should organize "One Big Canadian Union" and withdraw from affiliation with the American Federation of Labor, which has its headquarters and the bulk of its membership in the United States.

The idea is not meeting with complete endorsement, as is evidenced by the observations of David Rees, international organizer of the United Mine Workers of America, who is an old coal miner and closely in touch with the coal miners' unions in British Columbia and Alberta. He says, in part:

"There is no doubt in my mind that the Western Conference should have done that for which it was called together—that is, it should have outlined a more progressive policy for the Trades and Labor Council of Canada. We find that in centers like Toronto, Montreal and in other parts of the East the labor people are clamoring for a change. Consequently, had the Western Congress outlined its policy it could well have hoped to have had the Eastern labor men working unitedly with it on the occasion of the next Trades Congress at Hamilton, Ont., next September."

Recently an Industrial Commission was appointed to investigate the relations between capital and labor throughout the Dominion of Canada. G. D. Robertson, the Minister of Labor, has announced that the question of the labor situation in the mines of British Columbia will be tackled first. The coal-mine workers are bitterly opposed to the appointment of T. Moore, president of the Trades and Labor Congress, and I. W. Bruce as members of the commission representing labor. The Fernie mine workers' leaders have been telegraphing the Minister of Labor and Dr. Bonnell, the member of Parliament for the district, demanding that these appointments be reconsidered.

Simplest Thing in the World To Cut Your Liberty Bond Coupons

SLICK STRANGER RELIEVES MEN OF LIBERTY BONDS
HAZLETON, Pa., April 9.—A slick stranger, who has been working among the foreign speaking men in the vicinity of Jeddo, has walked off with a number of Liberty Bonds on the pretense that he was a government official appointed to pay the interest on the bonds, and that he had to collect the bonds each time before paying interest.
WHAT HAPPENED— THE WRONG WAY
THE UNITED STATES OF AMERICA
ONE HUNDRED DOLLARS
WHAT SHOULD HAVE BEEN DONE— THE RIGHT WAY
CLIP THE COUPONS AND TAKE THEM TO THE BANK

CUT OFF your coupons as they become due and get your money for them from the bank or from the company for which you work. Each coupon shows when the payment of your interest is due from the Government and how much the interest is. Keep hold of your bond, don't part with it till you sell it. Cut off only such coupons as are due. If you can't tell which are due, ask a banker or the clerk at the company store. Don't do business with complete strangers from outside your home town, no matter how smoothly they talk.

DISCUSSION BY READERS

EDITED BY JAMES T. BEARD

Calculating Depth of Shaft

The following algebraic solution has been offered by two contributors, regarding the problem presented in *Coal Age*, Mar. 6, p. 464, in which the depth of the shaft is calculated from its width and the amount a plumb-bob rises when swung from one side to the opposite side of the shaft.

In the case mentioned, the width of the shaft was 20 ft. and the plumb-bob rose 6 ft. when swung to the opposite side. In the solutions offered, x = depth of shaft. Then,

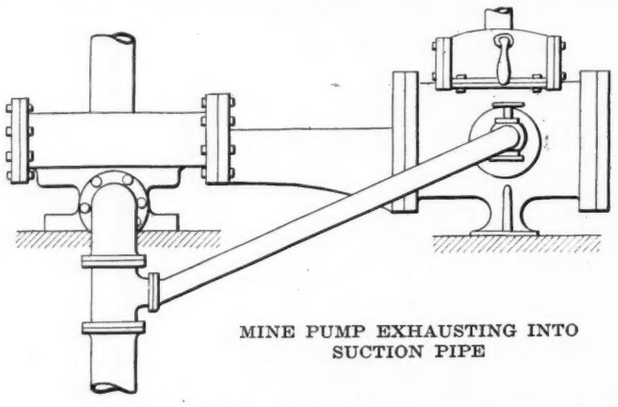
$$x^2 = (x - 6)^2 + 20^2$$
$$x^2 = x^2 - 12x + 36 \times 400$$
$$12x = 436$$
$$x = 36\tfrac{1}{3} \text{ ft., or } 36 \text{ ft. } 4 \text{ in.}$$

West Pittston, Penn. RICHARD BOWEN.
Terre Haute, Ind. V. SRAJN.

Exhaust from Steam Pump

Letter No. 1—In answer to the inquiry of "Assistant Superintendent," *Coal Age*, Mar. 20, p. 549, in regard to turning the exhaust steam from a mine pump into the suction or the discharge line of the pump, let me say that my experience has taught me that much benefit can be derived from exhausting into the suction pipe.

In my own practice, I have adopted this plan many times, and it has not only made it possible to get rid



MINE PUMP EXHAUSTING INTO SUCTION PIPE

of the annoyance of the steam exhausted into the mine entries, but I have found that it decreases the back pressure on the steam-end of the pump, and the same amount of water can be pumped with a lower steam pressure than when exhausting into the atmosphere.

On the other hand, I can see nothing but trouble ahead should the exhaust be turned into the discharge pipe. I have never seen that done or tried to do it myself, but the plan does not appeal to me as being practical, while the other scheme has always worked successfully.

One precaution, however, it is always necessary to observe. The engine must never be permitted to exhaust into the suction pipe, until after the pump is in full operation. Should the exhaust be turned into the empty suction pipe, before the pump has commenced to draw its water, the pipe would become heated and the pump would not start. A three-way valve must be provided that will permit the engine to exhaust into the atmosphere when starting the pump. Then, after the pump is running, this valve should be turned so that the engine will exhaust into the suction pipe, where the steam will be immediately condensed and pumped to the surface as water.

I have attempted to show in the accompanying sketch the connection between the steam end of the pump and the suction pipe. As shown in the figure, the three-way valve is located on the horizontal arm of the pipe attached to the exhaust nozzle of the pump. There is also provided a short nozzle for exhausting into the atmosphere when starting a pump.

SAMUEL MCKAY, Supt.,
Burgettstown, Penn. Harmon Creek Coal Co.

Letter No. 2—Kindly permit me to present a few comments, in addition to what has already been offered in reply to the inquiry regarding the proper disposal of the steam exhausted from a mine pump.

The inquiry does not state the size of the Cameron pump in question; but, judging from the fact that mention is made of exhausting the steam into a barrel, I would assume that the pump is a small one. This being the case, it is not to be expected that it would be desirable to go into great expense, in the way of making alterations required to produce any material change in operation. If no change is to be made in the piping arrangements about the best plan that could be adopted would be to conduct the exhaust directly into the sump.

EXHAUSTING INTO THE COLUMN PIPE WOULD CERTAINLY PROVE A FAILURE

In regard to exhausting into the column pipe into which the pump is discharging, it can be stated with certainty that this would not be successful when pumping against a head of 25 or 30 ft. or more, as the back pressure opposing the exhaust would effectually counterbalance any advantage that would arise by reason of getting rid of the exhaust steam.

On the other hand, assuming that it is worth while to make changes in the installation, I would advise conducting the exhaust steam directly into the suction line of the pump. In doing this, let me suggest that the matter should be referred to some reliable pump manufacturer for their advice. In that case, all necessary details should be submitted, in order to permit him to act intelligently. Preferably, the proposition should be submitted to the manufacturer of the pump in question, who will be more familiar with its construction and requirements.

The arrangement will differ with almost every type of pump; but, in general, it may be stated that the exhaust steam entering the suction line will result in a condensing action and give a higher vacuum gage, whereby the speed and capacity of the pump will be in-

creased, the pump then discharging a larger quantity of water, per pound of steam consumed. With a properly designed nozzle, the efficiency of the pump will be increased.

In this connection, however, it should be remembered that the temperature of the water entering the pump will be raised somewhat, which will increase the corrosive action if the water is at all acid. The effect of this corrosive action on the pump barrel, plungers, valve seats, valves and column lines must be carefully noted to ascertain if the advantage to be gained will offset the injury that will be done to the equipment.

Turning the water into the sump will produce the same effect, as far as getting rid of the steam is concerned, but will not give the increased advantage due to the higher vacuum gage produced when exhausting into the suction pipe. Where the mine water is very acid I would not recommend the plan of exhausting into the suction pipe. If possible, in such case, turn the exhaust into the sump, or into some abandoned airway or conduct it at once to the surface.

Scranton, Penn. SUPERINTENDENT.

Gravity-Plane Haulage

Letter No. 2—Referring to the letter by "Wire Rope," *Coal Age*, Mar. 6, p. 459, responding to an inquiry regarding a proposed gravity-plane haulage, which appeared in the issue of Jan. 2, p. 32, allow me to suggest that it would be interesting if the writer of that letter would adduce figures to prove the superiority of the aërial tramway that he advises installing in place of the gravity incline proposed in the inquiry. His reference to the cost of the wire rope required for the operation of the incline seems to point to that factor as determining his choice. It would be instructive if he would give us some idea as to the probable cost of rope for his aërial tramway.

Regarding the question of space available for landing 25-car trips, since no mention is made in the inquiry of any unfavorable conditions, it is natural to assume that this question has been duly considered by the superintendent making the inquiry and that proper landing space can be provided. Let me add, also, that in remarking favorably on this proposed aërial tramway (p. 459), the editor should have gone more fully into the matter than he did and explained the reason for his conclusions in respect to the proposition.

GRAVITY TRAMROAD VS. AERIAL TRAM OR CABLEWAY

Although the inquiry does not state what tonnage it is desired to handle from the mine to the tipple, it would be further interesting to know what tonnage it would be possible to handle over an aërial tramway; and it is to be hoped that "Wire Rope" will give us his estimate of the capacity of such an equipment. Knowledge of the experience of one or two individuals, with this means of transportation, makes me skeptical, to a degree, of its advisability.

Personally, I can see no reason why it should be impossible to operate a tramroad such as was proposed in the inquiry of this superintendent, if ample provision is made in the original plant, in respect to factors of safety in hoisting and in relation to rope, drawbars, couplings, shackles, etc. Even if it can be shown to be impracticable to run 25-car trips on this incline, I believe it can be successfully operated by the use of a gunboat or monitor.

The reply of the editor, following the inquiry (page 32) suggests the use of a "barney" to counterbalance the weight of the descending loaded trip, the weight of the barney being yet sufficient to draw an empty trip of the same number of cars up the incline. May I inquire what advantage would be derived from the use of this barney, and ask to know the experience on which his suggestion is based.

LONG AND STEEP GRAVITY PLANE CONTROLLED BY WATER-COOLED AIR BRAKE

Referring to the statement of "wire rope," who says he has never seen an incline operated by gravity on as large a scale as the one proposed in this inquiry, let me say that this fact does not prove the proposition to be impracticable. I have in mind a gravity tramway that is 5800 ft. long and contains about 2500 ft. of 20 per cent. grade. Trips of 17 cars are operated by gravity on this tramway. The empty cars weigh 3250 lb., each, and carry an average of 3.6 tons of coal. Occasionally, a car will be loaded with 5 tons of coal.

Taking the first figure given, which is a fair average capacity for these cars, a loaded trip of 17 cars will carry 122,400 lb. of coal and have a total weight of 177,650 lb. A 1½-in., 6-strand, 19-wire Roebling, blue-center, rope is used on this incline. Tandem, slip-ring drums are installed at the head of the incline to lower the cars. The drums are equipped with internal water-cooled brakes actuated by air compressed by the operation of the machine.

This incline has handled an average of 2300 tons of coal per day, month in and month out. I know of several other gravity trams where the conditions are probably as severe as those involved in this inquiry. Also, allow me to ask why the editor suggested a 1¼-in. cast-steel, 6-strand, 7-wire, haulage rope for this tramway.

R. M. MAGRAW, Gen. Supt.,
Hiawatha, Utah. United States Fuel Co.

In the experience of the editor, the advisability of installing an aërial cableway, for the transportation of minerals from a mine opening located at a considerable elevation above the tipple where the output is to be loaded for shipment, is based on the following items: Ease and rapidity of installation and lower first-cost of equipment; continuous and uniform transportation of output from mine to tipple; liability to delays caused by derailment, making up of trips, weather conditions, etc., reduced to a minimum; minimum cost of upkeep by reason of eliminating track repairs; avoidance of risks due to runaway cars on incline; and less wear and tear of mine cars, due to hoisting on steep inclines. Where the arrangements for loading the buckets are made automatic, no system of inclined-plane haulage can equal the tonnage capacity of an aërial cableway, and nothing is more convenient or safer in its operation.

The suggestion of employing a barney is made for the purpose of reducing the margin between the weight of the descending loaded and ascending empty trips and thereby lessening the duty of the brake required to control the speed of the drum sufficiently to insure safety. This is based on an experience had in the operation of a gravity plane in the far west (1884) and the later observation of the working of steep inclines in the middle Anthracite Valley (Penn.).

Regarding the suggested 1¼-in., cast-steel, 6-strand, 7-wire, haulage rope (page 459), it will be noted that,

making allowance for the added weight of the rope, the estimated diameter of this rope was finally increased to $1\frac{3}{8}$ inches.

Mining practice assumes that a 6-strand 7-wire haulage rope gives better service on an incline than a 6-strand, 19-wire, hoisting rope, owing to its greater resistance to abrasion, the individual wires of the former being larger than those of the latter, which also gives greater rigidity to the rope for haulage purposes.

It should be stated, here, that it is, of course, possible to lower any weight of loaded trip on an incline having any steep grade whatsoever, provided that it is possible to control the descent of the loaded cars with safety. Numerous instances are on record, however, of steep inclines operated by gravity that have been the scene of serious and fatal accidents, owing to the failure of the brake to control the descent of the loaded trip. For this reason, it is always practicable to govern the number of cars hauled on such an incline, so as to avoid this risk by establishing a safe margin between the weight of the loaded and empty trips; or by employing a barney as a go-between on such inclines.

Correct Accounting

Letter No. 2—Referring to the letter of Thomas T. Brewster, which appearedin *Coal Age*, Mar. 13, p. 501, it appears to me that the view he takes of the proper accounting of mine equipment and supplies is radically wrong. While it may be admitted that there would result a slight saving in the matter of accounting, if such minor items as fall under the head of supplies for immediate use were to be charged at once to operating expense, the same rule will not apply to actual equipment and to many other supplies that must be carried in stock in order to avoid the delay that would result if it was necessary to send for such supplies every time they were needed.

Let me illustrate by assuming that the inventory for the year 1918 showed, say three locomotives, five pumps, 20,000 ft. copper wire, eac., and the following year, there sis purchased one locomotive, two pumps, 2000 ft. of wire, or other similar equipment. It stands to reason that the inventory for 1919 will then show four locomotives, seven pumps, 22,000 ft. copper wire, etc. Now, as stated in the editorial note that follows Mr. Brewster's letter, a suitable valuation should be attached to each item of the inventory, and these values will decrease year by year, according to the life of each article of equipment. The total valuation, however, shown by the inventory may be much increased by the purchases for that year.

Equipment and Stock Supplies Not Expense

My idea is that much of the equipment and material purchased for the operation of a mine will last for 10, 15 or 20 years and be a part of the entire plant. Evidently, it would be wrong to charge the cost of such items to the operating expense of the single year when they were purchased. It is my opinion that all new material, such as wire, tee rails, motors, pumps and other machinery, should be charged either to the equipment or the stock account. Then, when supplies are taken from the supply room for use in the mine, they should be charged to operating expense. Only in this way can a correct account of the expense of running a mine be kept for each year.

When a piece of equipment has become so badly worn that it is no longer of use and is discarded, it is cast aside or, as we say, "scrapped," but the balance sheet for the year will show the net loss or gain. At the end of each fiscal year, the balance of the equipment account must be made to conform to the inventoried valuation of equipment by crediting the former account with an entry that is then charged to the profit-and-loss account, on the ledger. In closing, let me say that I would be very sorry to have my operating expense account charged with material that was not used in the operation of the mine for that year and which my son or grandson might use in years to come.

Burgettstown, Penn. ACCOUNTANT.

A Modified Longwall System

Letter No. 2—Referring to the interesting article of F. A. Pocock, *Coal Age*, Feb. 27, p. 395, regarding the 5-entry, panel-longwall system he has presented for the working of a 3-ft. seam of coal such as the Freeport or Kittanning series, let me say that it would seem that the author of the article has concentrated his entire thought on producing a method that would insure the largest possible output in the shortest possible time. Whether or not this plan can be worked out in detail, in practice, remains to be seen.

There are, to my mind, some objectionable features respecting the details given by Mr. Pocock, in the working out of the system he presents. These objections suggest themselves to me as the result of a long experience in longwall mining, in Scotland and England and, later, in Pennsylvania, where I had to contend with strata and conditions similar to those he has described.

Brief Survey of the Proposition

If I understand the proposition correctly, it is proposed to start the development by driving a five-entry system of main headings, and turn five-entry crossheadings to the right and left of these, leaving 600-ft. pillars between each set of crossheadings. As the work proceeds, the plan appears to be to work out each alternate pillar on each side of the main heading, on the advancing system, by starting a longwall conveyor face, after leaving a solid pillar of coal 300 ft. thick for the protection of the main headings.

It is proposed to use two conveyors on each face, the length of each conveyor being 100 yd. As each advancing longwall face reaches the boundary, the succeeding alternate pillars are then to be drawn back in a similar manner, on the retreating system. The coal is to be undercut to a depth of 10 ft., using an arcwall machine for that purpose.

My first objection refers to the proper support of the roof, which is described as not being self-supporting over a considerable area. Let me assume, for instance, that the conveyor requires a space of 2 ft. 6 in., and the cutting machine, another 3 ft., while the depth of undercut is 10 ft. The best support that can be given, in that case, is to set posts within a foot of the coal and immediately behind the machine as it moves along the face.

Now, when the machine has finished one cut across the face, the area of roof left unsupported over the coal that is undercut will be, at the least, $(10 \times 600) \div 9 = 666$ sq.yd. The fact that this roof must remain unsupported until the coal has been loaded out makes

it a question in my mind if a very serious collapse of the roof will not take place. It seems to me that it would be a miracle if an accident did not follow.

Another objection that occurs to me relates to the proposed deep undercutting of the coal. I believe that any person who has had much experience in longwall machine mining will agree with me that at least some of this coal will be wedged practically solid and will have to be blasted before it can be loaded out.

It is also a question whether all of the coal from a 10-ft. mining can be cleared from the face, each day, in time to allow packs being formed at each end of the face and the necessary chocks built and the conveyor moved forward. Mr. Pocock has even suggested three shifts a day, the machine making a 10-ft. cut in each shift, which is practically impossible of accomplishment.

Ten-foot Cut Not Safe in Longwall Work

Again, it is my belief that it will require twice the manual labor to load a 10-ft. cut onto the conveyor than would be required with a 5-ft. cut; and the results will not show the same tonnage per man. After the first 5 ft. of the 10-ft. undercut has been loaded out, the difficulty of handling the remaining 5 ft. would suggest the necessity of, first, moving the conveyor forward and drawing and resetting posts and cribs, all of which would increase the time for the roof to settle and bind the coal that remains unloaded.

I do not wish to be understood, however, as holding that the proposed method has no good features, as my objections relate only to the details of working. Let me say that, in my opinion, better results would be obtained by pushing the development until a number of sections can be opened that would give the same output with a 5-ft. undercut in the longwall faces.

Such a plan would certainly be more favorable to the support of the roof and avoid the risk of the undermined coal being held fast by the settlement that will naturally take place when a 10-ft. cut is made in the face. Let me suggest, further, that special care must be taken to insure the complete withdrawal of all props and other timber supports in the waste, always leaving three rows of staggered props behind the conveyor.

The idea of securing a large output in the shortest possible time is all right if the method adopted is such as to insure the safety of the men and the property. Too great haste in gaining a large output, in coal mining, will generally involve future loss, as was the case when I assumed charge as general superintendent of a mine in Derbyshire, England, where my predecessor had worked out the coal too close to the outcrop and brought on a heavy squeeze, besides permitting the surface water to enter the mine.

McKeesport, Penn. Andrew Orr Bain.

Efficiency in Firebossing

Letter No. 14—A long experience in firebossing in mines, followed by a period of mine foremanship and a later service as state mine inspector, has interested me deeply in the discussion of the development of the highest efficiency in our firebosses.

I have come to realize to the fullest extent that all of these official positions carry with them great responsibilities. However, in respect to the safety and protection of life, I am convinced that the greatest responsibilities rest on every fireboss who attempts to discharge his duties faithfully to the state and to the men employed in the mine.

There are many qualifications that an efficient fireboss must possess, but the most essental are: practical experience, habits of industry, honesty and faithfulness in the performance of duty. He must also be resourceful and calculating, taking nothing for granted, but investigating every situation for himself and to his own satisfaction.

It is a matter of regret that too many miners who hold fireboss certificates, or mine-foreman certificates with fireboss privileges, seem to think that these certificates are the only qualifications they need, and make no further effort to increase their efficiency by diligent study. They forget or do not realize that the knowledge gained by such study will not only fit them for the better performance of their work, but will give them a quicker perception and enable them to grasp a situation more promptly and act more quickly and judiciously in an emergency.

Every fireboss must have a high estimate of human life. He must realize that the lives of the men employed in the mine are in his keeping. He should be fully awake to the great responsibility resting on him in his official position, and his attitude and bearing should be such that he will command the highest respect and confidence, both of the men in his charge and the company who employs him.

Full Control of Ventilation with Fireboss

Referring to the excellent letter of W. H. Luxton, *Coal Age*, Mar. 27, p. 590, I want to indorse the suggestion he makes that "the ventilation of the mine should be entirely in the charge of the fireboss." In my opinion, the fireboss should be the final judge as to whether or not the ventilation is sufficient or adequate in the section of the mine of which he has charge.

Personally, I would not accept the position of fireboss in a gassy mine, unless I was given full control of the ventilation. Neither would I undertake to perform the duties of that position in a mine where the fireboss was regarded as a "necessary evil," and made subordinate to the foreman in every respect.

For a number of years, I was employed as fireboss in a very gassy and dusty mine where I had full charge of the ventilation and gave such instructions to the foreman and bratticemen as, in my opinion, were required to conduct the air to those parts of the mine where it was most needed for the safety of the men. I ranked as foreman, in the absence of that official. If a slate fall occurred on a haulage road, at a time when the foreman was in some remote part of the mine, I at once assumed charge of the situation and started men to clear up the fall.

In that mine, when making my morning rounds it was my habit to note down any slate falls on the roads, stating how the slate would have to be handled—whether gobbed or loaded out, and how much time would be required for the work. I would give the number, size and length of timbers needed and report these items to the foreman. Besides that, I was able to inform him what was the prospect for a good day's run, stating where loose coal was plentiful and where shots had failed to break down the coal.

This information always enabled the foreman to properly distribute the drivers, and greatly expedited the work in the mine. It appears to me that any effi-

cient fireboss will do the same, reporting where dangerous conditions exist on the roads or in the rooms, and stating what is required to make such places safe. In fact, all unusual conditions should be reported to the foreman, by the fireboss on his return to the shaft bottom or the mine entrance.

Allow me to conclude this letter by saying that a fireboss should work in harmony and in conjunction with the mine foreman in every instance, having in view the safety of the men and the successful operation of the mine. At the same time, it is my belief that the line should be drawn when it comes to making it a part of the duty of a fireboss, even in small mines, to busy himself with pumps, tracklaying, setting timbers, and various things of a similar nature, as was suggested by Edward H. Coxe, in his letter, Jan. 23, p. 199. Mr. Coxe might just as well have used his imagination farther, and, perhaps, he would have found that mine foremen and superintendents of little mines have about as much time to devote to such work and the laying of track, as firebosses.

JOHN ROSE,
Dayton, Tenn. Former District Mine Inspector.

Letter No. 15—So many good points have been brought out in the discussion regarding "efficiency in firebossing," that it is difficult to say which is of the greatest importance. However, the most salient point that has developed appears to be the question of whether the fireboss, in addition to the duties required of him in making the examination of the mine in the morning and looking after the safety of the men and giving them needed instruction while at work in their places, shall do such other work as digging coal, ditching, tracklaying, timbering and cleaning up falls.

While I believe the disposition of a good fireboss should be such as to make him generally useful (and this would certainly add to his efficiency in most mines) too much depends on the need of his keeping in close touch with the conditions existing in the mine to enable him to do much else besides, particularly if the mine is generating gas. It must be remembered that conditions, in most mines, are not so favorable that the safety of the mine, respecting gases and proper ventilation, is assured when the fireboss has completed his rounds in the morning.

In addition to making the examination of the working places, roadways and travelingways, the fireboss must often do much work in the way of putting up brattice that a shot has dislodged, before he can clear a place of gas. At times, it may happen that he is obliged to hang canvas that should have been put up by the bratticemen the day before; and, it is safe to say, that the morning examination will often prove a busy half-shift.

THE SECOND ROUND OF THE FIREBOSS

The second half of a fireboss' shift will generally have to be devoted to a closer inspection of the working places, in order to see that bad roof and other dangerous conditions are removed, necessary timbers set, breakthroughs made in compliance with the law, and air-courses and travelingways cleared of all obstructions. The proper performance of these duties will generally leave him little time for the other work mentioned.

In the event of a fall blocking the track, wires down, or cars derailed, it is of course the duty of both the mine foreman and the fireboss to lend a hand and do everything possible to restore conditions and prevent delays. I have seen many good firebosses help their foremen in a way that has increased the production of the mine. Such firebosses are doing far more efficient service than when directed to perform some manual labor that can be done as well or better by other men.

There are, undoubtedly, a large number of firebosses who are responsible and dependable in respect to the reported condition of the mine as being safe for work, but the number who prove their efficiency by assisting the foreman in a way that increases the production of the mine, I believe, is not so great. Firebosses of the latter type are a valuable asset to the foreman and the company who employ them. It should not be expected, however, as some of the remarks that have been made would seem to intimate, that a mine foreman should hand over the keys of his authority to his fireboss.

TWO TYPES OF EFFICIENCY IN FIREBOSSING

No good foreman will fail to appreciate the service rendered by a truly efficient fireboss and give him due credit for his work; but he will not waste much time with a fireboss who lacks ambition and possesses no qualifications for a higher position. A foreman is apt, at times, to keep such a fireboss busy and ask him to perform tasks that will not interfere with his regular duties in looking after the safety of the mine. Such firebosses represent one grade of efficiency. They are faithful, reliable and trusted by everyone in the mine.

Another type of efficiency is represented by the fireboss who, while just as qualified for his own particular work, possesses the knack of proving himself useful in other ways, by his success in the handling of men, expediting the work and increasing the output of coal. It is this class of men that are not satisfied to remain in the position of fireboss. Their peculiar ability is recognized, sooner or later, if not by their own company, then by others. Good men cannot be kept down.

AN EXAMPLE OF GOOD FIREBOSSING

The following incident, which I recall, illustrates exactly my idea of *efficiency in firebossing:* A young fireboss came suddenly on a gang of men cleaning up a fall. His unexpected approach interrupted their moments of leisure and the men jumped for their tools, only to discover that, as they said, "We thought you were the boss," whereupon they again resumed their pipes and attitude of leisure.

As the fall blocked off one section of the mine from which much coal was hauled, the young fireboss promptly threw off his coat and started to break some of the slate, saying as he did so, "Do you want me to tell the boss that you fellows quit?" The men were quick to observe that he made no attempt to display his authority or to assume that he was a boss, and the result was that they started at once to work and indulged in no more foolishness.

The foreman was never told of the incident; but the fireboss, it should be stated, gained the reputation of being efficient, which he richly deserved. It is a common thing for some firebosses to air their supposed grievances, but such are not the ones who are in line for promotion.

ESSEX.
Thomas, W. Va.

[This letter will close the discussion on "Efficiency in Firebossing."—Editor.]

INQUIRIES OF GENERAL INTEREST

ANSWERED BY JAMES T. BEARD

Dew Point in Mine Air

Kindly explain, in the columns of *Coal Age*, at what temperature air will deposit its moisture on the roof, floor and sides of an airway in a mine. Also, please state at what temperature air will begin to absorb moisture from the mine workings. STUDENT.

Thompson, Penn.

The capacity of air to carry moisture depends on its temperature. In other words, the weight of water vapor required to saturate a cubic foot of air increases as the temperature of the air rises, but not in the same ratio. When the point of saturation of air, at any given temperature, is reached the weight of vapor contained in a cubic foot of the air is a fixed quantity. It is evident, then, that any fall of temperature when the air is saturated will result in some of the vapor being deposited as moisture. The point at which moisture begins to be deposited is called the "dew point," which varies with the temperature. The pressure or tension of vapor also changes with the temperature and must be taken from a table of saturated-vapor pressures.

Now, applying these facts to the conditions existing in mine workings, we will assume the temperature of the mine is, say 60 deg. F. The vapor pressure, at that temperature, is 0.2545 lb. per sq.in., and the corresponding absolute temperature 460 + 60 = 520 deg. F. Knowing these data, the weight of vapor saturating a cubic foot of air or space is calculated by the formula

$$w = \frac{5793 p_v}{460 + t} = \frac{5793 \times 0.2545}{520} = 2.8 \text{ gr. per cu.ft.}$$

But the outside air blowing into the mine may not be saturated and its temperature may be such that it may hold a greater or a less weight of moisture than this amount. For example, suppose the outside air has a temperature of 80 deg. F. and 60 per cent. humidity. That is to say, the air is only carrying 60 per cent. of the weight of moisture that would saturate it.

Now, when this air enters the mine and its temperature has fallen to that of the mine atmosphere (60 deg. F.), its capacity for carrying moisture is greatly lessened. The weight of moisture taken into the mine is

$$w = 0.60\left(\frac{5793 \times 0.5027}{460 + 80}\right) = 3.2 \text{ gr. per cu.ft.}$$

In making these calculations, it is necessary to refer to a table giving the saturated vapor pressures corresponding to different temperatures ("Mine Gases and Ventilation"—Beard, p. 62. Notice the saturated vapor pressure, for a temperature of 60 deg. F., is 0.2545 lb. per sq.in., while that for a pressure of 80 deg. F. is 0.5027 lb. per square inch.

In the case just cited, it is evident that the intake current, which was *dry*, on entering the mine at a temperature of 80 deg. F., carries 0.4 gr. per cu.ft. more moisture than is required for saturation at 60 deg., or the temperature of the mine workings. Assuming a current of 100,000 cu.ft. of air per min., under these conditions, the weight of water deposited in the mine as moisture would be (100,000 × 0.4) ÷ 7000 = 5.7 lb. per min., or nearly ¾ gal. a minute.

It is evident that the answer to the question—"At what temperature will moisture be deposited in a mine air?"—depends largely on the temperature and humidity of the intake air. When the intake current carries a greater weight of misture than will saturate the air at the mine temperature, the excess moisture will be deposited in the mine, but not otherwise. Air is said to be "dry" when it carries less moisture than is required for its saturation, and "wet" when any decrease of its temperature will cause a deposit of moisture; or, in other words, when the dew point is reached.

In answer to the second question, it can only be said that *dry air* will always absorb moisture from moist bodies with which it is in contact. Here, also, the temperature at which this will take place depends on the conditions previously mentioned.

Efficiency of Mine Hoist

The card taken from an engine when hoisting at a certain shaft mine showed that the indicated horsepower, or the power developed in the cylinder of the engine was 60 hp. At the time the card was taken, the engine was hoisting a load of three tons. The depth of the shaft was 148.5 ft. and it required just 30 sec. to make the hoist.

Now, neglecting the friction of the hoist, what is the efficiency of the engine? Also, what is meant by the term "compression," and what is its object?

Divernon, Ill. HOISTING ENGINEER.

To answer the first question, from the data given, it would be necessary to make no allowance for acceleration or retardation when starting and stopping the hoist, and assume that the speed of winding was 148.5 ÷ 30 = 4.95 ft. per sec. In that case, the work performed in the shaft is (3 × 2000) 4.95 × 60 = 1,728,000 ft.-lb. per min. On that basis, the efficiency of the engine is

$$\frac{1{,}728{,}000 \times 100}{60 \times 33{,}000} = 90 \text{ per cent.}$$

However, while this method gives what may be called the *average efficiency* of the hoist it is well to remember that the work in hoisting is not uniform; but, starting from zero, at the beginning of the hoist, the power expended increases to a maximum during acceleration; and decreases when retardation begins, till it again becomes zero when the hoist is finished. To estimate the efficiency of the engine under full load at maximum speed it is necessary to know the time of acceleration and retardation.

The term "compression," in engine practice, refers to the compression of the steam in the cylinder of the engine from the time the valve closes the exhaust port to the end of the stroke. The object sought is to assist in bringing the piston to rest and starting it forward on the next stroke.

EXAMINATION QUESTIONS

ANSWERED BY JAMES T. BEARD

Miscellaneous Questions

(Answered by Request)

Ques.—How can you tell whether or not any obstruction is in an airway or air-course that you have not passed through?

Ans.—Any unusual obstruction in an airway would be indicated by a decrease in the quantity of air passing, or an increase in the water gage, or both, for that airway or section of the mine. Assuming the power on the air remains unchanged, any obstruction in an air-course decreases the quantity of air passing and produces, at the same time, a rise in the water gage, the quantity of air varying inversely as the water gage.

Ques.—What is the rubbing surface in an airway 4 ft. high, 9 ft. wide and 1000 ft. long?

Ans.—The rubbing surface in this airway is $1000 \times 2(4 + 9) = 26{,}000$ sq.ft.

Ques.—What is the capacity of a double-acting plunger pump if the plunger is 20 in. in diameter, the stroke 40 in., and the pump is making 25 r.p.m.?

Ans.—The sectional area of a 20-in. plunger is $a = 0.7854\left(\frac{20}{12}\right)^2 = 2.182$ sq.ft. At a speed of 25 r.p.m., a single plunger makes 50 strokes a minute, and the length of stroke being 40 in. or $3\frac{1}{3}$ ft., the plunger displacement is $2.182 \times 3\frac{1}{3} \times 50 = 363\frac{2}{3}$ cu.ft. per min. Unless otherwise stated, it is customary to assume the efficiency of the water-end of a good pump as 85 per cent. of the plunger displacement, which would make the capacity $0.85 \times 363\frac{2}{3}\left(\frac{1728}{231}\right) = 2720$ gal. per min.

Ques.—What equipment is required to be kept at the mine, for the care of the injured?

Ans.—The bituminous mine law of Pennsylvania (1911), Art. 13, requires that one ambulance and at least two stretchers, together with woolen and waterproof blankets, bandages, splints, and other medical supplies shall be kept on hand and ready for immediate use in time of need, at every mine in which 50 or more persons are employed inside. The law further provides that where 90 per cent. of the workmen live within a radius of a mile from the mine, no ambulance will be required; and where two or more mines are located within a mile of each other a single ambulance is sufficient for such mines.

Ques.—What must be the sectional area of a square airway that is required to pass 50,000 cu.ft. of air per min., under a 1-in. water gage, the length of the airway, including the return, being 1 mile?

Ans.—First, write the formula expressing the pressure required to pass a given quantity of air through a given airway. Thus,

$$p = \frac{kloQ^2}{a^3}$$

For a square airway, the perimeter is four times the square root of the area; thus, $o = 4\sqrt{a}$. Then, substituting this value for the perimeter of the square airway, in the formula just given, and solving with respect to the sectional area (a), gives

$$a = \sqrt[5]{\left(\frac{4klQ^2}{5.2w.g.}\right)^2}$$

Now, substituting the values $k = 0.00000002$; $l = 5280$; $Q = 50{,}000$; $w.\ g. = 1$, we find, for the sectional area of a square airway required to pass 50,000 cu.ft. of air per min. under a water gage of 1 in.

$$a = \sqrt[5]{\left(\frac{4 \times 0.00000002 \times 5280 \times 50{,}000^2}{5.2 \times 1}\right)^2}$$

$$= 132.77 \text{ sq. ft.}$$

Each side of this airway is $\sqrt{132.77} = 11.52$ feet.

Ques.—From what source is the greatest number of accidents at the working face, and how would you endeavor to lessen or prevent them?

Ans.—The latest report of the bituminous district of Pennsylvania, states that of the 412 lives lost, in the year 1916, in the bituminous mines of the state, 227, or 55.1 per cent. of these were due to "falls of coal, slate and roof." Of this number, 159, or 70.05 per cent., were killed at the faces of rooms; 37, or 16.3 per cent., while drawing pillars; and the remaining 31, or 13.65 per cent., on the entries, airways or travelingways in the mines.

Ques.—Ignoring friction, what quantity of water will be discharged from a borehole 22 in. in diameter and 4 yd. long, under a head of 150 ft.?

Ans.—The theoretical velocity due to a head of 150 ft. is $v = \sqrt{2gh} = \sqrt{2 \times 32.16 \times 150} = 98.22$ ft. per sec., and the area of a 2-in. hole being $(0.7854 \times 2^2) \div 144 = 0.0218$ sq.ft., the quantity of water flowing from the hole will be $60 \times 98.22 \times 0.0218 \times 7.48 = 962$ gal. per min., there being 7.48 gal. in a cubic foot.

Ques.—A certain fan is running at a speed of 75 r.p.m. and producing 50,000 cu.ft. of air per min. The air current travels 10,000 ft. in its passage through the mine. Now, if the air is short-circuited so as to reduce the distance the air must travel to 500 ft., would the speed of the fan be increased or decreased? Explain why.

Ans.—Reducing the length of air travel reduces the mine resistance in the same proportion. When the resistance against which a fan is operating is reduced, the result is that a larger quantity of air will flow through the fan. But, the frictional resistance within the fan itself increases as the square of the quantity of air passing. This means a large increase in the work absorbed within the fan and lost. The result is that less power is available for turning the fan, which will run a little slower under the same steam pressure at the throttle, than it did before the air was short-circuited.

In other words, the rush of air through the fan when the mine resistance is reduced or cut out causes a loss in the power available for turning the fan, because a larger proportion of that power is absorbed in passing the air through the fan itself. The power then turning the fan being less, the speed of turning is decreased.

FOREIGN MARKETS AND EXPORT NEWS

EDITED BY ALEX MOSS

Italian Coal Situation

An article in the *Corriere della Sera*, Milan, Mar. 16, 1919, states that the problem of obtaining an adequate coal supply in Italy has continued to become more serious since the armistice, although it was believed that with the suspension of hostilities the solution would gradually become easier. In order that the actual state of affairs may be well understood, it seems opportune to furnish certain data regarding the year preceding the war.

In 1913 Italy imported on the average 900,000 tons of coal per month, equal to 10,800,000 tons annually—2,200,000 tons for the state railways, 200,000 for the other railways and steam trams, 700,000 for the navy and merchant marine, 1,200,000 for the gas works, and the remainder for private industry.

During the war the consumption of coal by private industry increased in some branches, such as metallurgy, and decreased in others. The total shows a progressive decrease in accordance with the decrease in the total imports of coal, due to the shortage of tonnage and to diminished production. During the war the Italian government informed the allies that the requirements of Italy should be placed at 740,000 tons, which was later reduced to 690,000 tons. There was allotted a monthly supply of only 600,000 tons, but it was only an allotment, for there was always furnished a smaller quantity—5,280,000, equal to a monthly average of 440,000 tons in 1917; 6,400,000, equal to a monthly average of about 530,000 tons in 1918. The most critical month was February, 1918, during which Italy received only 328,000 tons of coal.

Before the war, of the total exports of coal to Italy about 9,000,000 tons came from England, about 1,000,000 from Germany and Austria, about 160,000 from France, and about 90,000 from the United States. America increased its exports of coal to Italy to 300,000 tons in 1914, and to 1,742,000 in 1915. In 1916 they were 1,056,000 tons, but in 1917 they dropped to 451,000 tons. In the last period of the war they ceased almost entirely, because, in their desire to save tonnage, the allied powers decided that Italy should be supplied with coal from England in preference to America.

The armistice having come, the Italian government had the assurance of a monthly average of 800,000 tons for two months and of 1,000,000 for the succeeding months, but instead of improving the situation has become steadily worse. In November Italy received 647,000 tons of coal; in December, 472,000; in January, 439,000; in February, 502,000. In March, in all probability, Italy will not receive more than 375,000 tons.

Temporary Supplies from France

Hon. Crespi recently obtained from the interallied economic commission the concession, without any assurance for the succeeding months, of 100,000 tons of coal from the Saar Basin, from St. Etienne and Salon. This 100,000 tons will arrive naturally, by land. It is a long-flame coal, not suitable for locomotives, and will serve for other uses.

With reference to the furnishing of coal by France, it may be said that this was carried on actively from January, 1918, to January, 1919. It was agreed to by the allies, always with a view to conserving tonnage, that France should ship its coal by land and replenish its supply from England.

In 1918 Italy received 2,000,000 tons of French coal out of total imports of 6,400,000. The balance was all English. Italy only received 42,000 tons from France in January and February. All the rest was English coal.

The Importation of American Coal

A favorable prospect for the solution of the difficult problem is contained in the possibility of sending American coal to Italy. England leaves Italy entirely free to obtain supplies from this country. Some time ago we tried to establish a regular service of supply to Italy. As yet, however, the great obstacle has been the lack of ships. It was necessary that Italy should send for the coal herself, and such ships as were available were not sufficient to actually establish a regular importation. It was an absolute impossibility to do so, and it must be borne in mind that 75 per cent. of the coal exported to Italy is handled by British ships and only 25 per cent. by neutral or Italian vessels. With regard to prices, owing to the increased cost of transportation, American coal is more expensive than the English. It appears, however, that we are preparing to make considerable reductions, which will facilitate the fulfillment of the desire which exists both in Italy and America to establish a regular service of supply.

Requirements of Certain Industries

The requirements of the Italian brick manufacturers are 60,000 tons per month even for a moderate activity in the industry; the metallurgical establishments are now renewing their activity after some months of depression; the steamship lines again in operation need 30,000 tons per month; the railroads now use 240,000 tons per month, but if Italy is to restore the service as it was before the war she will need at least 300,000 tons for her railroads. The gas works, at a reasonable estimate, use 76,000 tons per month, and in the end it will be necessary to let them have 100,000 tons, without calculating the needs of the recovered territory.

Ships Will Soon Be Available For Foreign Trade

The next thirty days will find our ships available for the world's foreign markets, according to a statement given to the American Manufacturers' Export Association by John H. Rosseter, Director of Operations of the United States Shipping Board.

Mr. Rosseter, in replying to a request of the Association for information regarding the recent report to the effect that the European civilian relief program would take a great many vessels away from export trade, gave assurances that the Shipping Board is making every effort to fairly meet the extraordinary demand for American ships.

"Until the economic policies that will control international commercial interests are actually declared by the Peace Conference," said Mr. Rosseter, "America's business interest must mark time in the march the country is to take into the markets of the world. The action of the Government as far as its present shipping policy is concerned has been taken, "asserted Mr. Rosseter," for the purpose of clearing away as rapidly as possible the clouds of uncertainty that now hang over the foreign markets of the world.

"If economic reconstruction and readjustment in international affairs is to be rapid," Mr. Rosseter continued, "the business and commercial interests of the country must for a very short time continue to evidence the remarkable spirit of patience so splendidly displayed throughout the months of the war. The situation in Europe today is exceedingly precarious. It is plainly the duty of the United States to aid in removing these conditions which are impeding a rapid and quick return to normal in the country's foreign commercial affairs. With this as a guiding purpose, the Government is sending one hundred million dollars worth of foodstuffs for distribution among the starving peoples of Europe. The completion of this food program is most important. The proper solution of the great questions now before the Peace Conference depends upon its successful completion. To successfully complete it, the Government has found it absolutely necessary to devote practically every ton of its available shipping to that end. Ships that are essential in regular foreign trade routes have been assigned to the food program. The Government realizes fully what this kind of disruption to ordinary and routine trade means, but I can give the business interests of the country the utmost assurance that this condition is only temporary.

"The Shipping Board has provided not less than 1,390,000 deadweight tons of steamers for European relief during a period of three months.

"The foreign business interests of the United States," Mr. Rosseter points out, "are giving precedence to two programs—the Government's food program on the one hand and the Army program on the other. The food program is being carried out for the purpose of infusing new life into the markets of Europe, Russia and the Balkans; the Army program, which is all-important, has to do with the bringing home of our boys within the shortest possible time. Ships play an important part in both these programs. Until they are completed, America's commercial interests must make the most of a difficult situation."

When asked specifically whether the Government was withdrawing ships from commercial purposes to assign them to the two programs mentioned, Mr. Rosseter replied:

"The fact is, that the commercial interests of the country have not been given the opportunity to utilize America's new merchant fleet. Conditions from the time we entered the war up to the present moment have been such that sacrifice was the watchword of America's business men as far as foreign markets have been concerned.

"I personally believe that the next thirty days will find our ships available for the world's foreign markets, and the industries of the country will no longer be obstructed for want of tonnage. Of course, as I have pointed out, we are now taking the first real and definite step toward that object—the completion of the two shipping programs now before the Government.

"Today I can happily say we see our way clearing to carrying in United States ships the total of all the European relief demands, and we can now turn our attention and our surplus ships to commercial needs."

Foreign Coal Trade Opportunity

An American consular officer reports that a man in Switzerland wishes to represent an American coal firm. References are furnished. Those interested may obtain the name and address by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or any of its branches. Refer to Number 29180.

Increased Cost of Fuel in Argentina

Supplies of all kinds have increased tremendously in price in Argentina since the beginning of the war and have been hard to obtain at any price; but the increase in price and scarcity of fuel has contributed more directly than any other factor in increasing the cost and difficulty of operating the railways. Coal has risen in price from about $7 before the war to something like $50 in 1918; in 1916-17 the average price was about $25 or $30 a ton. In normal times the Central Argentine Ry. consumes annually about 400,000 tons; the Great Southern, 380,000; the Pacific, 280,000; the Western, 190,000; and other companies in proportion to their mileage and traffic. Not only has coal increased in price but the supply has been so limited that the railways have been forced to burn large quantities of wood.

It is estimated that the Great Southern, the Buenos Aires Pacific, the Buenos Aires Western, and the Central Argentine together use approximately 3,000,000 tons of wood annually under the present abnormal conditions. In addition, the industrial enterprises burn 8,000,000 tons, and all this fuel must be brought down from a restricted area in the northern part of the

republic. The carrying capacities of the lines serving this region are wholly inadequate, with the result that the Southern and some of the other systems having no wooded districts of their own to draw from have been unable to obtain sufficient wood at any price.

Coal Mining Development in Belgian Kongo

(British and South African Export Gazette)

Coal, and above all, good coking coal, is the one great essential to the adequate development of Katanga's vast mineral and other industrial resources. Had the great coal field, discovered some seven years ago in the region traversed by the Lukuga River, produced coal suitable for the manufacture of coke, it would doubtless have been exploited long ere this and despite the war, but we believe the small amount of development work originally attempted by the Societe Geologique et Miniere des Industriels Belges has long been at a standstill. Now, however, interest in the subject is revived in connection with the recent discovery—in which the concern mentioned participated—of important coal measures situated on the main railway line some distance north of Elisabethville. Whether these, unlike those in the region of Lake Tanganyika, will afford an early supply of coking coal remains to be seen. From the scanty evidence before us we are inclined to regard both fields as of very similar character, and, therefore, not likely to produce the class of coal required—at least, not until it becomes possible to carry the workings to a greater depth than has hitherto been reached.

In spite of this, there is good ground for anticipating a revival of practical work on the coal fields of Katanga, both in view of the great opening offering for bunker coal at Dar-es-Salaam, Zanzibar, and even Mombasa and Beira, and the advisability of converting the railway locomotives and lake steamboats of Katanga itself from the use of wood fuel to coal. With such large areas of coal measures already assured, it is unthinkable that a policy of inertia should be continued now that that incubus of war conditions is lifting, and especially in view of the possibility of striking coal suitable for the production of coke, for which the great local copper-smelting industry offers a market already large and capable of unlimited expansion. At present Katanga imports coal and coke from Rhodesia, mainly for the service of the copper-smelting industry to an annual value of, roughly, $262,500; but the country's actual requirements, in order to do away with the use of wood fuel and eventually to keep pace with the extension of the Cape to Cairo line northward, must far exceed this figure.

Abbreviations in Foreign Correspondence

American coal exporters, in corresponding with foreign firms, make frequent use of trade abbreviations and commercial terms which are not understood and cause considerable embarrassment. When an abbreviation is first used its meaning should be explained fully, as commercial terms, and particularly technical abbreviations, although familiar enough in business circles in the United States, may be entirely unknown abroad. Fluctuation in exchange and different systems of measurement cause sufficient perplexity to foreign merchants without this additional handicap of trade abbreviations or technical terms so often misunderstood or unintelligible.

Coal Mining in Coahuila, Mexico

The effects of the reëstablishment of the coal-mining industry in Coahuila, reports Vice Counsul Blocker from Piedras Negras, Mexico, under date of Feb. 20, have been very far-reaching, because other industries have been benefited. It is the opinion of well-informed persons that the development has reached a point where about 40,000 tons of coal (steam and railroad) and about 18,000 tons of coke are produced and marketed monthly, this being something like one-half and one-third, respectively, of normal production. The producers have now reached the point in their improvements and developments whereby the aggregate output could be rapidly and permanently increased to nearly normal, provided the market were in a condition to absorb the increase.

Owing to difficulties and peculiarities of the geographical and transportation conditions, it is economically impossible to market this coal south of Mexico City, on the west coast, in Sonora, Cananea, etc. To these districts fuels are imported, principally from the United States.

The recent great decline in the prices of metals, such as copper, lead and zinc, and the lack of a market for these ores, has affected the coal-mining industry. Several smelters have suspended operations entirely, and all have curtailed their work. This means a decrease in consumption of coal and coke.

Hampton Roads Coal Exports

NORFOLK

			Cargo	Bunkers
Lamberts Point				
Apr. 12	Amer. S.S. Roy H. Beattie	Pernambuco, Brazil	2,876	318
Apr. 14	Amer. S.S. Ulysses	Cristobal, C. Z.	12,035	992
Apr. 14	Nor. S.S. Eika III	Port Antonio, Jamaica	1,576	256
Apr. 15	Amer. S.S. Lake Lesa	Barbados, B. W. I.	2,908	724
Apr. 16	Nor. S.S. Nepos	Barbados, B. W. I.	4,094	414
Apr. 19	Ital. S.S. Veniero	Gibraltar (Italy)	7,000	700
Sewalls Point				
Apr. 15	Amer. S.S. Noord Brabant	Rio de Janeiro, Brazil	3,317	552
Apr. 19	Amer. S.S. Lake Champlain	Havana, Cuba	1,787	295
Newport News				
Apr. 14	Nor. Bk. Charles Racine	Rio de Janeiro, Brazil	2,490	....
Apr. 14	Amer. S.S. Lake Orange	Antilla, Cuba	2,452	274
Apr. 15	Amer. S.S. Lake Arline	Havana, Cuba	2,806	329
Apr. 16	Am. Sch. Geneva Kathleen	Santos, Brazil	934	....
Apr. 16	Amer. S.S. Lake Fondulac	Havana, Cuba	3,279	373
Apr. 17	Amer. S.S. Lakeside	Rio de Janeiro, Brazil	1,988	665
Apr. 18	Brit. S.S. Paparoa	Wellington, N. Z.	3,483	2,100
Apr. 18	Am. Sch. Jennie Flood Kreger	Rio de Janeiro, Brazil	2,628	....
Apr. 19	Amer. S.S. Craycroft	Cienfuegos, Cuba	2,678	400

Increase in Price of German Coal

Since Sept. 1, 1918, the price of coal and coke in Germany has doubled, reports the *Berliner Tageblatt* of Mar. 21, in printing the list of the basic rates effective Apr. 1, announced by the Rhenish Westphalian Coal Syndicate. Under the new schedule, the price of anthracite ranges from about $17 to $18 a metric ton (2200 lb.), coke brings from $20 to $22, and briquets from $15 to $16.50. This represents an advance since Jan. 1 of $5 a ton for coal and briquets, and $7.50 for coke. How much more than these prices is paid by the ultimate consumer is not noted.

The *Tageblatt*, while admitting that there is a certain justification for the rise because of the many strikes, which have kept down production and caused material increases in wages, laments bitterly over the decision of the coal barons, and declares that the high prices are dealing a heavy blow to German industry and constitute a real national calamity. It points out that the iron and steel men are likely again to increase the prices of their products as a result of the rise of the cost of fuel, and that the prospects for a resumption of German domestic and foreign trade are gloomy indeed. Before the war coal in Germany sold at from $4 to $5 a ton.

To Form Coal Export Association Under Webb Law

J. H. Wheelwright, of Baltimore, president of the National Coal Association, at a meeting of the Board of Directors of the association held at Cleveland, Ohio, on Apr. 23, told the directors that the Government had invited him to request the bituminous operators to form an export association, under the Webb law, somewhat similar to the organization of textile importers.

Mr. Wheelwright said Government officials had decided that assistance should be given to coal exporters in obtaining ships and in other ways, in order that conditions abroad might be alleviated by American coal and a permanent foreign trade in coal be established. Appointment of a committee to proceed with the formation of a coal exporters' association was authorized.

Coal for St. Lawrence Ports

The coal trade between Nova Scotia mines and St. Lawrence River ports, which was interrupted through an incident of the war, will likely be restored at an early date in consequence of a decision in the English courts in a suit brought by the Dominion Steel Corporation against a number of vessel owners. When war was declared the owners took the stand that their charters with the Corporation for carrying their coal were canceled, and sent the vessels on more lucrative business elsewhere for the past four years.

The value of this trade may be gathered from the enormous increase in imports of bituminous coal from the United States. During the year ending March 31, 1918, these imports of American bituminous coal to Montreal and Quebec amounted to $8,331,021, as compared with $2,418,169 for the year ending March 31, 1914. The difference, amounting to about $6,000,000 a year, will represent the amount of Nova Scotia coal trade to St. Lawrence ports which was lost through the action of these vessel owners. The courts have ruled that the vessels must be returned to the Dominion Steel Corporation until the expiration of their charters, which are on favorable terms for a long period of years, just as soon as they are released from Government service. The corporation will also claim heavy damages from the vessel owners for failure to carry out their contracts.

Coal in Maracaibo

Hard coal of good quality is found to the west of Maracaibo, in abundance on a concession owned by the Caribbean Coal Co., an American corporation. As yet no coal has been exported from this region, but it is expected that in a few years a railroad from the mines to deep water of the Gulf of Venezuela will be completed and that as much as 500,000 tons of coal can be exported from that mine annually.

Foreign Freight Rates

W. W. Battie & Co.'s coal trade freight report for Apr. 28 states that freight conditions are practically the same as a week ago, and that the few charters effected during this period were at the Chartering Committee's maximum rates. The demand for tonnage to carry coals to the River Plate has decreased considerably, and the report states that English firms are now selling Cardiff coal there at figures which American shippers cannot compete. Consequently American exporters are losing their share of the River Plate coal business.

The Chartering Committee's rates are as quoted below:

Steam—Havana, $7.50, 600 tons dis.; Cardenas or Sagua, $9, 300 tons dis.; Cienfuegos, $9, 500 tons dis.; Caibarien, $9.50; 300 tons dis.; Guantanamo, $8.50, 500 tons dis.; $9, 400 tons dis.; Manzanillo, $9.50, 300 tons dis.; Bermuda, $9.50, and Bermuda, p. c. and dis. free, 300 tons dis.; Kingston, $9.50, 400 tons dis.; St. Thomas, $10, 500 tons dis.; St. Lucia, $11, 500 tons dis.; Santiago, $8.50, 500 tons dis.; $9, 400 tons dis.; Barbados, $11, 500 tons dis.; Port of Spain, Trinidad, $11, 500 tons dis.; Curacao, $10.50, free p. c. Curacao, 500 tons dis. Rio, $19.50 net, 1000 tons dis.; Santos, $19.50 net, 1000 tons dis., or $21 net, 600 tons dis.; Buenos Aires, $18.50 net, 600 tons dis.; Montevideo, $19.50 net, 750 tons dis.; Pernambuco, $18.50 net, 500 tons dis.; Bahia, $18.50 net. To Nitrate Range, $165.50 gross, prepaid.

Sail (maximum)—Para, $15.50 net; Bahia, $18.50 net; Pernambuco, $18.50 net; Rio, $19.50 net; Santos, $19.50 net; Rio Grande do Sul, $20.50 net, 400 tons dis.; Buenos Aires, $18.50 net; La Plata, $18.50 net; Montevideo, $19.50 net. To Nitrate Range, $16.50 gross, prepaid.

COAL AND COKE NEWS

EDITED BY ALEX MOSS

Harrisburg, Penn.

Representatives of some of the largest producers of anthracite and bituminous coal in Pennsylvania on Apr. 22 entered protest against any increase in rates for workmen's compensation at the second conference on the suggested amendments held at the Capitol.

B. M. Clark, of Punxsutawney, representing the Central Bituminous Operators' Association, and James E. Eichenauer, of Pittsburgh, speaking for the Pittsburgh Coal Operators' Association, said that any legislation for an increase would be ill-advised at this time, as conditions are abnormal, costs are at the peak, the market is depressed, and the mines of the state are facing serious competition from other states. Mr. Clark made an extended argument, saying that sales are now made at a loss and that he does not see any immediate betterment.

John Brophy, representing the central Pennsylvania miners, of which he is the president, said that the mine workers did not expect the industry to be at a low ebb always, and that "the coal companies can afford this increase and should be made to afford it; the miners expect it and feel that it is due them." Mr. Brophy said that the market conditions were bad now, but looked for an improvement.

Thomas Kennedy, president of District No. 9 of the anthracite mine workers, said he could not reconcile the statements of the anthracite operators' representatives in agreement with those of the men from the bituminous field, because the conditions in the hard and soft coal fields are entirely different. In the anthracite region the mines are working six days a week with an advance in price coming. The miners, he said, were promised an increase in compensation and have been patient. He said that faith should be kept with them and reminded his hearers that in western states farmers organized politically. In Pennsylvania, he said, the miners are organized.

Brownsville, Penn.

In the central Pennsylvania bituminous field the mines producing the United States Navy preferred grades of smokeless coal are faring well and working better than in the recent past. In the western Pennsylvania field there is little change. In the Connellsville coke region the reduction in output keeps steadily on, but there is a feeling among many that the bottom must soon be reached notwithstanding the controversy over steel prices.

The proxy committee of the United Coal Corporation has notified stockholders that since sending out the proxies for the annual meeting a proposition has been received from the J. H. Hillman & Sons Co., and approved by the board of directors of the United Coal Corporation, for the mutual operation of these and other properties, and that the name of the latter company be changed to "Hillman Coal and Coke Co." The proposition will be submitted for the approval of stockholders of the United Coal Corporation at the annual meeting to be held May 5.

There would not seem to be much doubt as to how this proposition will be received, as Mr. Hillman is the majority stockholder of the United Coal Corporation. The "other properties" will presumably include the Hecla Coal and Coke Co., of which Mr. Hillman is principal owner and president, and possibly the Thompson-Connellsville Coke Co., of which Mr. Hillman will soon obtain control.

Charleston, W. Va.

High rates to lake points from West Virginia's producing regions were impeding the fullest development of lake business during the third week of April, in addition, of course, to the fact that there was much coal still on hand in lake territory. Despite such conditions a slightly larger volume of coal was being moved from West Virginia to lake points than had been the case earlier in the month, but such increases were limited to one or two districts, tending, of course, to increase production in such districts.

Coal is moving to tidewater in about the same proportion as it had been in preceding weeks. Export orders are becoming somewhat more plentiful, some coal having been purchased for delivery to points in Sweden. The fullest development of export business has been greatly retarded insofar as West Virginia coal is concerned by a shortage of vessels. Such export orders as have been received, however, have given impetus to production at some mines in the state.

Strict adherence to the imposition of penalties for demurrage is tending to make tidewater embargoes no longer necessary. Shipments of coal for railroad use during the week ending April 19 see-sawed considerably. During part of the week railroad fuel constituted one-third of the total shipments from certain regions. By the middle of the week such shipments had materially decreased. Railroads are not purchasing West Virginia fuel on long-time contracts.

The large amount of coal it has been necessary to screen in getting out prepared sizes has had its effect on the price of slack, which being accumulated in large quantities, has declined to some extent.

Production at the most was not over 45 per cent. during the third week of April in West Virginia.

There are in the southern part of West Virginia a total of 767 mines, or rather mining properties. This is shown in geographical mining maps prepared by Secretary Walter H. Cunningham, of the West Virginia Coal Association, who resides at Huntington. Such properties are located on the Virginian, Chesapeake & Ohio, Norfolk & Western, Kanawha & Michigan, Coal & Coke and Kanawha & West Virginia railroads.

After May and June no further examinations to determine the fitness of miners to hold mine foremen's certificates will be given, but during May and June seven examinations will be held under the auspices of the State Department of Mines on the following dates and at the following places: Fairmont, May 13; Wheeling, May 20; Charleston, May 27; Mt. Hope, June 3; Thomas, June 10; Logan, June 17; Welch, June 24. Another examination will be held for the benefit of those taking the miner's short course, at the end of that course at the State University.

Huntington, W. Va.

In connection with the announcement recently made as to the plans of the Main Island Creek Coal Company at Sterrett, it is also stated that within a short time the company will be able to begin the operation of six new mines at that point, working in the Island Creek seam. Through the operation of those new mines the company will be able to increase its total product to the extent of 6000 tons a day at least. This will place the Main Island Co. among the large producers of the state, as the company has already an annual production of 846,696 tons. Opening of the new mines will relieve the unemployment situation in the Logan field, as many miners will be given work. In planning for the extension of operations the company is also giving much consideration to the advancement of living conditions among employees and is providing adequate recreational facilities.

Coal from the mines of the Island Creek Coal Co. operating in the Logan field, filling 23 barges, left Huntington on Saturday, Apr. 19 in one coal tow, the largest ever shipped by water from Huntington in one tow. Had the coal been loaded in average capacity railway cars it would have required 322 cars to transport the coal.

Fairmont, W. Va.

A number of mines in the northern part of the state, and particularly in the Fairmont region, are working on export orders, some of the coal so mined being for consumption in Sweden and some for consumption in Italy. Undoubtedly such a class of business has tended to prevent greater idleness among the mines in northern West Virginia. There would have been, and there would be now, a large volume of such business if only the vessel space could be secured for the transportation of such coal.

There was, to some extent, a diminution of lake shipments from the Fairmont region during the week ending Apr. 19. Coal was being moved to lake points at the rate of about 50 or 60 cars a day. Coal for tidewater was moved at the rate of about 40 or 50 cars a day; that is, from the Monongah division of the Baltimore & Ohio. While the shipment of railroad fuel started off with a flourish, it gradually diminished during the week, being at the rate of about 135 cars a day during the latter half of the week.

It is regarded as certain that over half the mines in the northern part of the state were idle during the week and that production on the whole was not over 45 per cent., if that much. Contrasted with previous weeks, the demand for coal is livelier.

Louisville, Ky.

The Northeastern Kentucky Coal Operators' Association, in session at Paintsville, Ky., recently decided to undertake welfare work on a much larger scale, in an effort to provide better roads, schools, churches, and homes for their employees, of whom there are about 20,000 in all. A committee was named which will investigate conditions in the best fields, and endeavor to go them one better in an effort to make the miners more satisfied.

A legislative committee was named to advise the members of all pending legislative enactments, either Federal or state, and to coöperate fully with the National Coal Association, American Mining Congress and Kentucky Mine Owners' Association in preventing antagonistic legislation, and for the purpose of having enforced good state and Federal laws relative to mineral rights, liquor, compensation matters, etc.

The Community Welfare and Publicity Committee will endeavor to bring about better relations between miners and mine owners, promote common interest between producers, employees, consumers and carriers, to the end that mines may be operated on a fuller and better schedule.

Victoria, B. C.

An action is in progress in the courts of British Columbia in which the Canadian Collieries (D), Ltd., are the plaintiffs and the Pacific Coast Coal Mines, Ltd., the defendants, the suit being for damages for trespass and for an accounting and payment for coal alleged to have been taken from the Alexandre mine property, South Wellington, in 1911. The plaintiffs maintain that the coal was taken without their knowledge or consent, and it is understood to be the plea of the defendants that whatever was done by them was with the consent of the plaintiff company's officials.

With further reference to the Settlers' Rights Act of British Columbia, which was disallowed by the Dominion government in 1917 and on being re-enacted by the Province last year was refused the signature of the Lieutenant-Governor, it is interesting to note that the Vancouver Island settlers interested are making a concerted move to bring their case directly to the attention of the Federal Government. Meetings of those who have property without the coal rights therein have been held, and it is probable that a delegation will leave the Pacific coast shortly to carry the grievances to the ears of those in control at the Canadian capital.

The Merritt Collieries, Ltd., is opening up a new No. 3 slope. It is the Diamond Vale field and when completed is expected to result in a material increase in the coal production of that section.

A distinct improvement is apparent in the coal production of British Columbia during the month of March in comparison with that of February, there being a difference of approximately 28,000 tons. The total for March is about 223,000 tons. The reason definite figures are not given is that

returns have not been received from one or more of the smaller of the Province's producing mines. In March the Crow's Nest Pass Collieries were working at least five days a week, which is better than was done in February. It may be observed incidentally, in connection with the Vancouver Island output, that the new Wakesiah mine of the Canadian Western Fuel Co., which was expected to be in operation by this date, is still in the development stage, the work of opening up the property having ceased some weeks ago.

New York, N. Y.

Charles S. Allen, secretary of The Wholesale Coal Trade Association of New York, representing that organization and a number of individual producers and shippers, has filed with the Interstate Commerce Commission the complaint authorized by the Association, against Walker D. Hines, Director-General of Railroads, and 23 railroad companies as defendants with a view of having the Commission establish new demurrage regulations and also to issue an order to prevent the collection of any unlawful demurrage charges which have been assessed against the complainants since Dec. 1, 1918, and which remain unpaid at the present time.

These charges, Mr. Allen estimates already amount to $500,000 on bituminous shipments in the New York harbor alone, and to $1,000,000 on shipments of anthracite and bituminous in the ports of New York, Baltimore and Philadelphia.

Mr. Allen in his complaint charges discrimination against the tidewater ports in that Mr. Hines or his agents, the railroads, maintain at the so-called lake ports a demurrage rate or charge of $1 per car per day in excess of five days, or other number of days, or free time averaged over periods of six months, or any other periods exceeding one month, while contemporaneously maintaining at the so-called tidewater ports of New York, Philadelphia, Hampton Roads and Baltimore a demurrage rate of $2 per car per day in excess of five days' free time average over a period of one calendar month, which he says "results in an undue and unreasonable preference and advantage to said 'lake ports' and an undue and unreasonable prejudice and disadvantage to the said 'tidewater ports' and to the other consuming centers to which coal is shipped through such ports; and also results in undue and unreasonable preference and advantage to buyers in the coal fields shipping to or through the lake ports as against buyers shipping to or through the tidewater ports; that if due consideration be given all the facts, circumstances and conditions surrounding the transportation, delivery and handling of coal to the tidewater ports as compared with the lake ports, a longer free time, averaged over a longer period and with no higher demurrage charge or penalty would be justified at the tidewater ports than at the lake ports."

On and after today (May 1) the office of J. W. Howe, Commissioner of the Tidewater Coal Exchange, will be located in this city instead of in Washington, D. C. At the same time it was announced that J. W. Searles, the Deputy Commissioner at New York, had resigned and would return to his former position as sales manager of the Pennsylvania Coal and Coke Corporation in the Whitehall Building, and that A. D. Thompson, who was assistant to Mr. Searles, had also resigned and had accepted a position with the Wittenberg Coal Co., 11 Broadway. R. A. Magruder, who was chief clerk in the Washington office of the Exchange, will continue to occupy the same position in the New York office.

Bids were opened in the New York War Department offices on Apr. 22 for furnishing and delivering 5500 tons of bituminous coal, deliveries to be made between May 1 and June 30 to places designated by the Quartermaster's Corp. Bids were based on net tons f.o.b. mines, and were as follows: Alden Coal Mining Co., Pool 10, $2.38; Pool 11, $2.24. Whitney Coal Mining Co., Philadelphia, Pool 11, $2.10. Cortright Coal Co., Philadelphia, Pool 4, $2.75; Pool 9, $3.10; Pool 10, $2.95; Pool 11, $2.60. E. P. Bavlo, Hampton, N. J., Pool 10, $2.09½. Dickerman & Englis, Pool 10, $2.65. Salem Coal & Coke Co., Clearfield, Penn., Pool 14, $2.49. Curry Coal Mining Co., Expedit, Penn., Pool 10, $2.60. Huskin Coal Mining Co., Windber, Penn., Pool 10, $2.75. Midland Mining Co., Cumberland, Md., Pool 10, $2.65. Seaboard Coal Co., New York, Pool 11, $2.60. Indiana Smokeless Coal Co., Pool 11, $2.09. Barnes & Tucker, Philadelphia, Pool 10, $2.55. Operators' Coal Mining Co., Johnstown, Penn., Pool 10, $2.65; Pool 11, $2.65. Campbell, Peacock & Kinzer, Philadelphia, Pool 10, $2.13.

PENNSYLVANIA

Anthracite

Middleport—The Kaska colliery of the Alliance Coal Co., near here, will be placed in operation soon. The dewatering of the workings is a big job and is causing the delay in resuming mining at this time.

Harrisburg—President John Brophy, of the central Pennsylvania or No. 2 district of the United Mine Workers of America, with a large delegation of union men on Apr. 9, made a strong protest against the terms of the anti-sedition bill.

Wilkes-Barre—As soon as an adjustment is made of the assessment valuations on its property in Dauphin County, the M. A. Hanna interests intend to electrify their collieries. It is declared that the proposed change will cost between $1,250,000 and $1,500,000. Steam is now being used for power.

Berwick—Coal dredging in the Susquehanna River between Berwick and Bloomsburg has already begun with excellent prospects of securing large quantities of coal at a profitable producing cost. Several ambitious Columbia County coal dredgers make more than a comfortable living in this business.

Hazleton—Engineers employed by Weston Dodson & Co. at their Locust Mountain colliery are now engaged in making a survey of the G. B. Markle Co. operations, with a view to applying more efficient mining plans. The presence of these men on the Markle property gave rise to a rumor that the Dodson company would acquire the Markle holdings, which rumor was promptly denied by the latter company.

McAdoo—A corps of engineers has been busy between this point and Rush Valley during the past few weeks, but its mission is a mystery. The work of proving for anthracite is under way on the Kinkie tract, at Quakake, and it is thought that the survey is in connection with this activity. Miners who were employed at Silver Brook years ago declare that there is plenty of coal in the basin which lies between Hazleton and Tamaqua.

Carbondale—The Lackawanna County Coal Co. has opened an office in this city. The new concern owns in fee the West Mountain Coal Co.'s property at Jermyn and will operate on a fee-simple lease the property of the Falls Mining Co. and on lease terms the Northeast colliery at Simpson. About two million tons of coal are said to be available for mining at the three holdings just enumerated. In the near future all the coal from the three workings will be prepared for market at the Northeast breaker. The breakers at the Falls and Jermyn plants will be dismantled. It is planned to spend about $50,000 in modernizing the Northeast colliery, and operations at the collieries will be enlarged. Electric equipment is being installed at all the plants. Coal-cutting machines are also to be provided.

Bituminous

Indiana—Pleasant Valley, a village a short distance from Lovejoy is to be the location of a new coal plant to be built by the Clearfield Bituminous Corporation. Lumber is already on the ground.

Altoona—Thirty miners presented themselves for examination here, Apr. 8, when the examining board for the tenth bituminous district met to inquire into their fitness for the offices of mine foreman and fireboss.

Portage—Alexander Brown, of Portage, a mine foreman, died at the Memorial Hospital, Johnstown, of injuries sustained on Apr. 12 in the Brown and Ghroke coal mines at Portage when he was caught under a fall of rock, the rock crushing his chest.

Webster—The United Coal Corporation is changing its Ella mine, near here, from making its own power, to power purchased from the West Penn Power Co. The rope haulage and fan, which are now steam-driven, are also being changed to electric drive.

Savan—The new mines of the Dor-Mar Coal Co. here have been closed for a period of two weeks on account of the installation of new machinery. Boilers and a haulage engine have been added to the equipment and the mines resumed work a week ago Monday.

Brownsville—The Snowdon Coke Co., operating near this place, has purchased seven acres of surface about halfway between its operation and Brownsville, on the Pittsburgh-Brownsville paved road, and will build thereon a number of houses for their employees during the spring and coming summer.

It is reported that an agreement has been reached between J. Harte Hillman, Jr., of Pittsburgh, Penn., president of the Hecla Coal and Coke Co. and William H. Brennan, of Uniontown, Penn., president of the Thompson-Connellsville Coke Co., whereby Mr. Hillman will take over the control and management of the Thompson-Connellsville Coke Co. May 1 instead of waiting till July 1, as previously arranged.

Waterman—The store of the Traders' Supply Co. at the Coy mines near here was destroyed by fire recently. Upon investigation it has developed that it is the work of some dissatisfied workmen in this vicinity. The loss is placed at several thousand dollars as the building and stock was a total loss.

Johnstown—Almost one hundred applicants appeared before the examining boards of the sixth, twenty-fourth and thirtieth districts at the examination held here last week. All the boards held the examination in the same room. The thirtieth district board had the largest number, with 44 applicants for mine foreman.

Indiana—One of the landmarks of Indiana, Library Hall, is being torn down. Library Hall stood on the large plot of ground on Church St., which was purchased by the Rochester & Pittsburgh Coal and Iron Company as a site for their new office building here. Work will probably be started on the new building at once.

Homer City—The tipple of the Homer City Coal Co. at the Tearing Run mine was partially destroyed recently by a charge of dynamite being exploded under one of the tipple piers. There has been considerable trouble with some of the miners in this vicinity lately, and this is thought to have been a plot by the miners to get even for the coal companies in closing down some of the mines here. The company has offered a reward of $500 for the arrest of the dynamiters.

DuBois—The fourth bituminous district had only 29 applicants for certificates when the inquisitorial board met under the leadership of J. I. Thomas, the inspector of the district.

Consolidated Coal Co. officials inspected nearly all the mines of that company in West Virginia on Friday, Apr. 11, the party including Carl R. Gray of Baltimore, president of the Western Maryland Ry. and a director of the coal company; Geo. T. Watson, assistant to the president; Frank Lyon of Fairmont, general manager of operations; A. Brooks Fleming, Jr., Assistant general manager of operations; C. H. Tarleton, manager of the West Virginia division; A. T. Watson, purchasing agent; F. K. Day, district superintendent; L. A. Riggs, division engineer; F. R. Raeder, district engineer; H. R. Pratt, of Baltimore, chief engineer of the Western Maryland Ry.

Pittsburgh—The Pittsburgh Coal Co. has nearly completed a three-mile connection to its Montour-Clairton branch in the southern part of Allegheny County and the northern part of Washington County in order to develop over 4000 acres of the finest coal in these two counties. The officials regard the construction of this new branch and the development of the new mine, which will be known as "Montour No. 10," as the most important work undertaken by the organization in several years, both in size and immediate results. The output will run about 5000 tons a day. Most of the miners who will work the mine will come from the Lick Run mines of the company on the Baltimore & Ohio Railroad, a few miles below the new development.

WEST VIRGINIA

Elkins—The Elkins Coal and Coke Co. has recently completed the entire electrification of its local plant Power for operation is furnished by the West Virginia Traction and Electric Company.

Logan—Impetus has been given to the production of coal at the Logan mines of the Hutchinson Coal Co. by the receipt of orders for coal for lake delivery, such orders insuring operations on a full-time basis for the present.

Fairmont—So as to provide for additional railroad facilities the Connellsville & Dawson Coal Co. is planning for the construction of a double side track from its mines to the Baltimore & Ohio R.R. at Westchester, W. Va.

Fayette—The new power plant of the Ajax Coal Co. will be ready for operation June 1. The buildings are of stone and the equipment consists of two 150-hp. boilers, one 136-hp. engine, 96 kw. The work is being looked after by J. H. Belcher, of Cedar Grove, W. Va.

Wheeling—The Wheeling & Lake Erie Coal Co., a subsidiary of the M. A. Hanna Co., has completed negotiations for the acquirement of the three mines of the Pittsburg-Belmont Coal Co., located in Belmont

County, Ohio. It is understood that the consideration was about $1,500,000.

Thomas—For the time being, work has been suspended at the Elk Garden, West Virginia Junction and Davis plants of the Davis Coal and Coke Co. This suspension is of course only of a temporary nature. The company is operating its mines elsewhere on a basis of four days a week.

Alton—The Huston-Ziler Coal Co., which recently filed articles of incorporation with a capital of $100,000, is understood to be arranging plans for the commencement of work at an early date for the development of a tract of about 200 acres of coal properties acquired. It is expected to have an initial daily capacity of about 1½ cars.

Macdonald—The question of building new tipples at its plant at Whipple, Summerlee and Lochgelly, W. Va., is under consideration by the New River Co., operating in the New River field, the company having in mind an increase in the capacity of its mines, which now produce coal at the rate of 12,000 tons a day when in full operation.

Benwood—Announcement has been made that operations have been suspended indefinitely at the local plant of the Semet-Solvay Co., manufacturer of coke, effective Apr. 12, to allow for extensive improvements, etc. It is understood that the coal-mining industry in local sections will be effected by the suspension, as they furnish thousands of tons of coal to this plant monthly. This is the first time that the company has suspended operations in the past three years.

Fairmont—The Federal Government paid over to the owners of the land on which the plant of the Domestic Coke Corporation is being built the sum of $64,000. This was in payment for about 60 acres of land. The price paid per acre varied from $1000 to $1700. The number of men now engaged in construction work on the by-product plant is now in the neighborhood of 300. Work is also being pushed on a connecting track with the line of the Baltimore & Ohio Railroad.

Wheeling—With $1,500,000 said to have been the price paid, the Pittsburgh Belmont Coal Co., operating in the Eastern Ohio field, has come under the control of the Pittsburgh & Lake Erie Coal Co., one of the properties of M. A. Hanna & Co. This deal exceeds in magnitude any of recent months in eastern Ohio territory and involves a change in the ownership of three mines—No. 1 and No. 2 at Neff's and the No. 3 at Lafferty—making eight mines in all which will be operated by the Pittsburgh & Lake Erie Co. Acquisition of three additional mines will give the Hanna interests a greatly increased production in eastern Ohio. It is said, in fact, to be their intention to make their operations the largest in that field. Alexander Neff, president of the Pittsburgh Belmont Co., and Franklin Neff, vice president of that company, will probably remain with the new owners of their mines.

ALABAMA

Birmingham—Incomplete reports in the hands of Chief Mine Inspector C. H. Nesbitt, indicate a total coal production of approximately 18,000,000 net tons in Alabama during 1918. The output for 1917, the largest on record, was 20,413,811 tons. It is estimated that the coke production will fall short around 500,000 net tons, the make for 1917 being 4,868,598 tons.

OHIO

Zanesville—Realty deeds filed recently for record show the sale of the Harold Robertson farm, 385 acres in Washington Township, to Edward A. Laugenbach, of Canton.

ILLINOIS

Nokomis—The Nokomis mine, the Kortkamp mine, the Taylor Springs mine and the two Witt mines, which have been in the hands of T. C. Keller, receiver, were recently sold and bought in by the bondholders and will hereafter be operated as the Illinois Coal Properties Co., with Keller as superintendent.

Springfield—The Capitol Mine of the Springfield District Coal Mining Co. has been closed down and will remain closed several weeks while repairs are being made. The Nadrews and Woodside mines are also closed temporarily.

A bill has been introduced in the house providing for the inspection of coal mines every six months by inspectors employed by the Department of Mines and Mining. It has been referred to the Committee on Industrial Affairs.

Auburn—Two miners, Harry H. Sanders and Edward Smith, were recently killed by an explosion in Panther Creek mine, four miles north of here, attributed to a windy shot. Two mules also were killed. The two men were the only miners in the part of the mine where the explosion occurred. The accident occurred at 5 o'clock, just after the night shift had ceased work. The mine is a new one, about 300 ft. deep, owned by Solomon Brothers, of Auburn, and employs about 140 men.

Hillsboro—Drill tests of the quantity and quality of the coal field between Bunker Hill and Shipman are so satisfactory that A. W. Crawford, of this place, who represents a syndicate, announces that the coal rights of 15,000 acres will be paid for as soon as the titles can be secured. What interest is behind the proposed new development has not been made known, but J. D. Hurd, of Los Angeles, Cal., has been conferring with Crawford. The latter states that the field will not be developed, probably, for two years.

INDIANA

Terre Haute—Strikes affecting 840 miners in three mines are reported in the Terre Haute region. About 300 men are out at the Hall-Zimmerman Black Bettie mine. The trouble is said to be due to division of daywork. About 300 more men are out at Fayette mine, where the same kind of trouble exists. The Vandalia mine No. 28 has also closed for the same cause.

Du Quoin—Drilling has recently been completed on a tract of land 1½ miles south of town, owned by H. C. Miller, of the First National Bank of this city. The results of the test have not yet been made public and it is not known how soon steps to develop will begin.

It is reported that the Federal mine near Carterville, southeast of here, formerly known as the Burr mine and owned by the Peabody Coal Co., Chicago, is to begin hoisting coal again next week after being shut down since last November. According to Superintendent C. L. Rudder, the mine is to operate steadily from now on for an indefinite period. It is understood that the company has secured a large contract which will keep the mine working five days a week.

De Soto—The De Soto Coal and Mining Co., of which Frank Dickie is superintendent, is sinking its shaft down into a second vein of coal which was found to be of good quality coal from 3 to 4 ft. thick and good roof over it.

The E. J. Scott Coal Co., operating a strip mine at the southern edge of the city limits, is steadily increasing its daily output. The stripping is being done with a Bucyrus shovel which is said to be one of the largest in use. At the present time coal is being produced every day and one day's output fills from 30 to 35 railroad cars. The vein, which lies from 40 to 50 ft. underground, is an excellent grade of coal and is clean, as it is mined without special preparation. After the large Bucyrus shovel has uncovered the coal it is then loosened with dynamite and loaded into railroad cars by a smaller-sized caterpillar-type shovel.

Personals

James O'Donnell, a former mine inspector, is now superintendent of the new Raven Run Coal Co. at Raven Run, Penn.

Edgar E. Pike, who in civil life is president of the Marion County Coal Co. at Centralia, Illinois, is now in the U. S. Army service in the recently opened Army Hospital at St. Louis.

G. A. Murphy has severed his connections with the Independence Coal and Coke Co., Salt Lake City, Utah, to accept the superintendency of the Spring Canyon Coal Co. operations at Storrs, Utah.

W. H. Williams has resigned the vice presidency of the Hudson Coal Co., Scranton, Penn., to become president of the Wabash R.R., with offices in New York. **Charles Dorrance, Jr.,** general manager, has been named to succeed Mr. Williams.

Edward M. Fuller, construction engineer of the Utah Fuel Co., Salt Lake City, Utah, has tendered his resignation, to take effect May 1. Mr. Fuller will enter into a partnership with J. J. Coan, their business being engineering and contracting, under the firm name of Coan & Fuller, with offices at Salt Lake City, Utah.

Harold E. Bissell, a well known coal man, holding, for a number of years past, the positions of secretary-treasurer of the Black Diamond Coal Co., and secretary of the Benoit Coal Co., affiliated interests at Birmingham, Ala., has severed his connection with the above companies and purchased the business of the W. W. Phelps Motors Co., distributors for the Reo and Marmon cars in the Birmingham district.

G. C. Weitzell, who was president of the New Pittsburgh Coal Co., of Columbus, Ohio, when it was absorbed by the Pittsburgh Coal Co., has been made vice president of the late company in charge of Ohio and Kentucky mining properties and operations. **J. B. L. Horsberger** has been made vice president and comptroller in charge of taxes and insurance, with headquarters in Pittsburgh.

Capt. Le Roy Aikman, a member of the Alaska Fuel Commission, has been ordered to report for duty in Alaska and has departed for the Pacific Coast after a few days' visit with relatives in southern Illinois. Capt. Aikman was stationed in Alaska in 1912 at the time the Navy was making investigations of the fuel situation in that territory, and the return trip is to complete this work. The first experiment made by the Government showed that the Alaska coal was not equal to the West Virginia Pacahontas coal, while the second test from another field showed but a fraction of one per cent. difference in heat units between the two coals.

Coming Meetings

American Wholesale Coal Association will meet on June 3 at Cleveland, Ohio. Secretary, L. Romanski, Chicago, Ill.

Illinois Mining Institute will hold its annual meeting May 22, 23 and 24. Secretary, Martin Bolt, Springfield, Ill.

National Coal Association will meet May 21, 22 and 23, at Congress Hotel, Chicago, Ill. Secretary, J. D. A. Morrow, Washington, D. C.

Illinois and Wisconsin Retail Coal Dealers' Association will meet at Hotel Nelson, Rockford, Ill., June 4 and 5. Secretary, I. L. Runyan, Chicago, Ill.

International Railway Fuel Association will hold its annual meeting May 19-22 at the Hotel Sherman, Chicago, Ill. Secretary, J. G. Crawford, Chicago, Ill.

Retail Coal Dealers' Association of Texas will hold its annual meeting on May 19 and 20 at Fort Worth, Tex. Secretary, C. R. Goldman, Dallas, Tex.

Central Pennsylvania Producers' Association will hold its annual meeting May 15 at Chamber of Commerce Building, Altoona, Penn. Secretary, Charles O'Neill, Altoona, Penn.

Southwestern Interstate Coal Operators' Association will hold its annual meeting June 10 in the Keith and Perry Building, Kansas City, Mo. Secretary, C. N. Fish, Leavenworth, Kans.

American Society of Civil Engineers will hold its forty-ninth annual convention in St. Paul and Minneapolis, Minn., June 17 to 20. Secretary, C. W. Hunt, 33 West 39th St., New York City.

Mine Inspectors' Institute of the United States of America will hold its annual meeting July 8 to 11 at Indianapolis, Ind., subject to ratification of executive committee. Secretary, J. W. Paul, Pittsburgh, Penn.

National Retail Coal Merchants' Association will hold its annual convention at Buffalo, N. Y., May 14-16, with headquarters at Lafayette Hotel. Secretary-Manager, E. B. Gordon, 1727 Pennsylvania Ave., Washington, D. C.

Kentucky Mining Institute after having skipped two years, one on account of the war and the other due to the influenza epidemic, expects to hold its annual meeting this year. While the date and place of meeting have not definitely been set, it will probably be held on May 30 and 31 at Lexington, Ky. Secretary, C. W. Strickland, Huntington, W. Va.

Trade Catalogs

Stowage of Ship Cargoes. Compiled by the Division of Tabulation and Statistics. War Trade Board, Bureau of Research and Statistics. Unillustrated; pp. 69; 5¾ x 9¼ inches.

Vulcan Soot Cleaners for Return Tubular Boilers. Vulcan Soot Cleaner Co., Dubois, Penn. Bulletin. Pp. 4; 8½ x 11 in.; illustrated. Describes the Model M front-end type and the Model R rear-end type. Illustrations show the cleaner installed in typical settings.

Use of Shoveling Machines in Underground Mining. Myers-Whaley Co., Inc., Knoxville, Tenn. Catalog. Pp. 20; 10½ x 8¼ in.; illustrated. An interesting compilation of data concerning the general

construction of shoveling machine. Many applications of the machine in actual practice are given.

The Strong Arm of Industry. Electric Hoist Manufacturers' Association, New York, N. Y. Booklet. Pp., 12; 8½ x 11 in.; illustrated. Issued for the purpose of affording the reader some conception of the large field of usefulness for overhead electric hoists. Twenty-two different hoist applications are pictured.

Steamobile Road Truck. Winslow Boiler and Engineering Co., Chicago, Ill. Catalog. Pp., 16; 8x 10½ in.; illustrated. Introduces the application of the steam power plant in the automobile field. The boiler and engine comprising the power plant are described and pictured, and the specifications given for a five-ton steamobile truck.

Publications Received

The Inflammability of Aluminum Dust. By Alan Leighton. Technical Paper 152. Department of the Interior, Bureau of Mines. Unillustrated, pp. 15, 5¾ x 9¼ inches.

Seventh Annual Report of the Bureau of Labor. Department of Agriculture of the Province of Saskatchewan. For the twelve months ended Apr. 30, 1918. Unillustrated, 30 pp. 6¾ x 10 inches.

The Economical Use of Coal in Railway Locomotives. University of Illinois Bulletin; Vol. XVI., No. 2. Circular No. 8. Engineering Experiment Station. Illustrated, 76 pp., 6 x 9 inches.

California Mining Statutes Annotated. By J. W. Thompson. (Includes all California mining laws.) Bulletin 161, Law Serial 13. Department of the Interior, Bureau of Mines. Unillustrated, pp. 311, 5¾ x 9 inches.

Fume and Other Losses in Condensing Quicksilver from Furnace Bases. By L. H. Duschak and C. N. Schuette. Department of the Interior, Bureau of Mines. Technical Paper 96. Illustrated, 28 pp., 6 x 9 inches.

Coal South of Mancos, Montezuma County, Colorado. By A. J. Collier. Department of the Interior, U. S. Geological Survey. Bulletin 691-K. Contributions to economic geology, pages 293-310; illustrated; 6 x 9 inches.

Saving Coal in Steam Power Plants. Reprint of Engineering Bulletin No. 2, prepared by the United States Fuel Administration in collaboration with the Bureau of Mines. Technical Paper 217. Illustrated. 8 pp., 6 x 9 inches.

Preliminary Report of the Mineral Production of Canada During the Calendar Year 1918. Prepared by John McLeish, B. A., Chief of the Division of Mineral Resources and Statistics. Canada Department of Mines, Mines Branch. Unillustrated, 24 pp., 6½ x 10 inches.

Recent Coal and Coke Patents

Dump Car. H. S. Hart, Chicago, Ill., 1,289,035. Dec. 24, 1918. Filed Sept. 3, 1918. Serial No. 252,317.

Ash Sifter. R. Le Mond, Plainfield, N. J., 1,288,062. Dec. 17, 1918. Filed Dec. 18, 1916. Serial No. 137,630.

Coal Jigger. J. F. Wagner, Tamaqua, Penn., 1,288,311. Dec. 17, 1918. Filed Apr. 23, 1918. Serial No. 230,331.

Shield for Furnaces. J. R. Rishebegar, Braddock, Penn., 1,287,104. Dec. 10, 1918. Filed Apr. 17, 1918. Serial No. 229,116.

Coke Wharf. C. K. Baldwin, assignor to Robins Belt Co., Passaic, N. J., 1,287,179. Dec. 10, 1918. Filed May 12, 1915. Serial No. 27,663.

Furnace. A. Nilson, assignor to Eureka Smokeless Furnace Co., Chicago, Ill., 1,287,081. Dec. 10, 1918. Filed Jan. 19, 1917. Serial No. 143,228.

Method of Forming Baffle Walls in Boilers. F. J. Jewell, Rome, N. Y., 1,288,014. Dec. 17, 1918. Filed Oct. 17, 1918. Serial No. 258,662.

Apparatus for Handling Coal. R. M. Bickley, assignor to Heyl & Patterson, Inc., Pittsburgh, Penn., 1,288,375. Dec. 17, 1918. Filed Mar. 20, 1915. Serial No. 15,833.

Rotary Mine Car Dump. J. H. D. Petersen and A. J. Sayers, assignors to Link-Belt Co., Chicago, Ill., 1,286,580. Dec. 10, 1918. Filed Jan. 7, 1918. Serial No. 210,767.

Industrial News

Tiffin, Ohio—The Schaffer Engineering and Equipment Co. announces that it has changed the location of its offices from Tiffin, Ohio, to the Peoples Bank Building, Pittsburgh, Penn.

Pittsburgh, Penn.—The Concordia Safety Lamp Co. announces its removal from 420 Fulton Building to 317 Highland Building, Penn and Highland Aves., East End, Pittsburgh, Penn.

Charleston, W. Va.—No time will be lost by the Tolbert Smokeless Coal Co. in rebuilding the tipple and store building of the company. These structures were burned down in a fire a few weeks ago.

Morgantown, W. Va.—The West Virginia Traction and Electric Co. has recently completed the installation of a quantity of new coal-handling apparatus in the Morgantown power plant, to facilitate operations.

St. Louis, Mo.—The two-story frame coal chute of the Terminal Railway Association of St. Louis at Brooklyn, Ill., was destroyed by fire recently, with a loss on building, equipment and contents of about $100,000. The cause is not known.

Newcomer, Penn.—The Continental No. 3 mine of the H. C. Frick Coke Co., at this place intends erecting a belt conveyor from the bottom of the slope to the mine entrance, the coal being dumped into a railroad tipple without further transportation.

Wenonah, N. J.—A community coal yard is maintained by this village. When coal arrives citizens who have filed orders are notified to send check or cash to cover cost plus a slight margin for operating expenses. The borough teams then deliver the coal.

Charleston, W. Va.—With a capital of $25,000 the Curtis Branch Coal Co. has been formed, this company intending to establish operations at Ashford on Coal River, E. E. Huddleston of this city and others being the prime movers in the organization of the new company.

Columbus, Ohio—The Columbus Board of Education will soon advertise for bids for approximately 6000 tons of coal for the various school buildings of the city. Several dealers are urging the board to buy early in order that better service in the way of delivery can be rendered.

St. Clairsville, Ohio—The Pittsburg Belmont Coal Co., which has been operating three mines in Belmont County, has sold its holdings to the Wheeling & Lake Erie Coal Co. at a price about $1,500,000. The first-named company was controlled by Columbus and St. Clairsville men.

New York, N. Y.—There was carried by the Lehigh Valley R.R. Co. during the year ended Dec. 31, 1918, 15,522,953 tons of anthracite and 4,826,049 tons of bituminous coal and coke, according to the annual report of the company. In 1917 the road carried 14,916,894 tons of anthracite and 3,784,672 tons of bituminous coal and coke.

Boston, Mass.—The Bailey Meter Co. will move its main office and works from Boston to Cleveland, Ohio, effective May 1. The Boston office, with H. D. Fisher as manager, is retained to handle sales and engineering service work in the New England district. For the present, New York and Philadelphia districts will be covered from Boston and all other districts will be covered from Cleveland.

New York, N. Y.—The newly organized S K F Industries, Inc., held a sales convention at Hotel Traymore, Atlantic City, Apr. 29, 30 and May 1. The sales policies and methods of the new company, which is a consolidation of S K F Ball Bearing Co., the Hess-Bright Manufacturing Co., Atlas Ball Co. and Hubbard Machine Co., were discussed. About 45 salesmen and executives were present.

Allentown, Penn.—The Traylor Engineering and Manufacturing Co., by means of an attractive four-page folder, extends to those interested an invitation to visit its shops during the week of Apr. 28 and view the 60-in. Traylor "Bulldog" gyratory crusher built for the Michigan Limestone and Chemical Co. This is said to be the largest stone crusher in the world, having two receiving openings, each 60 x 190 in., and a capacity of 2500 tons of crushed stone per hour.

Columbus, Ohio—The Sunday Creek Coal Co., recently formed by a consolidation of the properties of the Sunday Creek Coal Co., of New Jersey, the Buckeye Coal and Railway Co. and the Ohio Land and Railway Co., has opened branch offices in Grand Rapids, Chicago, Toledo, Findlay and Ft. Wayne. The Toledo office will be under the charge of M. D. Kinsey, the Grand Rapids office under the charge of R. L. Teele, and the Findlay office in charge of F. J. Kelly. Other managers will be named later.

Cleveland, Ohio—Bituminous operators producing three-fourths of the country's soft coal rejected a proposal made by Fuel Administrator Garfield to the end that the Government continue to direct the affairs of the industry after the proclamation of peace. The plan, which had been submitted to operators and miners for ratification or rejection, came before the directors of the National Coal Association at a meeting held Apr. 23 on a referendum vote from approximately 2500 operators. Directors had been instructed by the various producing fields as to how they should vote.

Marion, Ill.—The White Ash mine at Marion, southeast of Duquoin, has been closed down in order to render it possible to make extensive repairs. A new dynamo is being installed, the tipple rebuilt and automatic loaders provided. No. 8 mine, at Clifford, owned by the Big Muddy Coal and Iron Co., started operating again Tuesday, Apr. 15, after being closed down since last November. During the intervening time extensive improvements have been made, a new wash house has been built and much money expended in repairing and replacing equipment.

New York, N. Y.—Of interest to all users of bearings is the recently announced reorganization, effective May 1, whereby the products of the Hess-Bright Manufacturing Co., the S K F Ball Bearing Co., the Atlas Ball Co. and the Hubbard Machine Co. will be sold through one central organization. The new company will be under the direction of B. G. Prytz, president; W. L. Batt, vice president; J. P. Walsh, comptroller, and S. B. Taylor, sales manager. The principal office will be at 165 Broadway, New York City, with branches at Boston, Philadelphia, Atlanta, Buffalo, Cleveland, Detroit, Cincinnati, Chicago and San Francisco.

Charleston, W. Va.—There were only 18 fatalities in and around West Virginia mines during March, the lowest number recorded in some time. It seems to be impossible to guard falling roof slate, etc., that still being the largest single cause of fatal accidents in the mines, as, for instance, the total number of fatal accidents from that cause in March was 18—66⅔ per cent. of the entire number. Two deaths followed mine car accidents within the mines and a mine machine accident was responsible for another death. Mine car accidents on the outside of the mines cost the lives of two men. There were six fatal accidents in McDowell County and five in Fayette. Of the total number of mine fatalities in March, 11 were among Americans, the remaining seven being foreigners.

Columbus, Ohio—Ohio produced 47,849,236 tons of coal in 1918, states George F. Miles, chief statistician of the Ohio Industrial Commission, in a bulletin issued Apr. 19. This showing exceeds by 6,000,000 tons that of any previous year, and was made under the impulse of speeding-up measures incident to war needs. Belmont County, in the eastern Ohio field, is credited with 12,165,253 tons, or about one-fourth the total for the entire state. Jefferson County ranks next, with 7,226,314 tons, and Athens County, in the Hocking district, is third with 6,654,682 tons. the other seven of the ten leading coal-producing counties had the following production: Guernsey, 4,493,718 tons; Perry, 3,542,338; Hocking, 2,347,657; Tuscarawas, 2,102,419; Harrison, 1,817,730; Meigs, 1,372,468; Noble, 994,889. The state's output was contributed to by 31 counties. Five-sixths of the mining was done by machinery.

Huntington, W. Va.—The Ohio Valley Mine Car and Manufacturing Co. has been organized principally through the efforts of Huntington business men with an authorized capital of $400,000. The company will manufacture mine cars and other mine equipment for sale to mines in West Virginia and Kentucky, but its plant—yet to be built—will be at Ironton, Ohio, the site for buildings having been provided by the Chamber of Commerce of that community. Pending completion of the new plant, the buildings of the Ohio Valley Machine Works, which have been purchased by the new company, will be utilized, this company having been engaged in the manufacture of mine cars. The new company was organized mainly through the efforts of M. E. Brown, of the Nuller Supply Co., John W. Herron, president of the Ohio Valley Bank, and M. Ferguson, vice president of that institution. The company will employ 150 men or more.

MARKET DEPARTMENT

EDITED BY ALEX MOSS

Weekly Review

Soft Coal Market Still Unsettled—Operators Do Not Want Federal Control to Continue After Peace Is Signed—Prices Being Maintained—Production Decreasing—Anthracite Industry in Full Swing — Steam Coal Prices a Little Higher

MARKET conditions in bituminous coal are still unsteady, and production is still falling off. A survey of the situation discloses that large stocks of soft coal are still in the bins of dealers and consumers, and the eagerly awaited buying movement must of necessity wait on the depletion of these reserves.

A plan for the continued Federal control of the bituminous industry after the signing of the peace treaty was opposed by the membership of the National Coal Association at a meeting held in Cleveland recently. The general sentiment of the soft coal operators seems to be that, while a plan of adjustment could have been worked out between representatives of the industry and the Government at one time, the attitude of the Railroad Administration in respect to its coal and steel purchases has made it virtually impossible to reach any agreement at this time. To put it concisely, the soft coal industry has absolutely no faith in the Railroad Administration.

The idea that prices of soft coal would suffer a considerable drop has about disappeared from the minds of many consumers, though there are yet a few who are buying only for their immediate needs in the hope that something will happen to repay them for waiting. These gentry are doomed to disappointment. There is no concerted cutting of prices. Small tonnages may be picked up here and there at figures below the former Government levels, but the better grades of soft coal are bringing even higher prices than were in effect during the fixed-price period.

During the week ended Apr. 19 the bituminous coal mines shipped 7,403,000 net tons, a decrease of 143,000 net tons compared with the output of the week ended Apr. 12. Mines are still working short time, the chief reason being that there is no market for a maximum output.

Anthracite mines, in the main, are working full time. Many operators have booked orders that will carry them well along into June, and retail dealers are delivering coal as fast as they receive it, to meet the call from household consumers. The situation in the hard coal market is almost the reverse of what it was a few weeks ago.

Steam coal is tightening. Instead of price reductions, some of the better grades of buckwheat produced by the so-called independent companies have been quoted at slight increases over what is known as the company schedule. Rice coal is in better demand than either buckwheat or barley. The production of anthracite during the week ended Apr. 19 is estimated at 1,568,000 net tons, a falling off of 182,000 net tons compared to the week preceding.

Consumption and Stocks of Coal in the United States During the First Quarter of 1919

STOCKS of bituminous coal in the hands of industrial concerns, the iron and steel industry and public utilities, gas and electric, declined 25 per cent. or about 8,000,000 tons in the three months from Jan. 1 to Apr. 1, 1919, according to information collected by the Bureau of Statistics and made public by the United States Fuel Administration. Stocks of bituminous coal in the yards of retail coal dealers were 40 per cent. less on Apr. 1 than on Jan. 1, but dealers had on hand Apr. 1 a quantity of bituminous coal one fourth as great as was sold and distributed in the first three months of this year. Such stocks in retailers' yards are considered large for April and are the result of the large accumulations last summer and fall, and of lack of demand the past few months of open winter weather.

The decrease in stocks of bituminous coal in the hands of consumers, including the railroads, in the United States the past three months probably did not exceed 16,000,000 tons. The drop in production of bituminous coal in the same period was 31,000,000 tons compared with January, February and March of 1918.

In proportion to his needs, the small consumer last year was the most successful in accumulating a supply of coal, and by the first of last November every nook and corner of the country was piled with bituminous coal. The small user, industrials using a car of coal or less a month, represents in number 75 per cent. of the total and but 11 per cent. of the consumption. These consumers had on hand last fall 1 per cent. of the bituminous coal in storage, on the average twenty weeks' supply, as compared with the largest users with seven weeks' supply.

With a large supply on hand and the fear of a coal shortage removed, and because of the let-down in manufacturing activity following the armistice and the mild winter, this class of user has been out of the market and will not again seek coal until next fall. Contributing also to the decline in demand has been a decrease in the rate of consumption of coal for industrials other than the iron and steel. The decline is indicated by a drop of 10 per cent. in the average weekly consumption of bituminous coal in January, February and March compared with the latter part of December.

As indicating the sections of the country where abnormally large stocks were accumulated it is noted that the storage piles of industrial plants in Delaware, Texas, Mississippi, South Dakota, Wyoming and Nevada were reduced more than 50 per cent. from Jan. 1 to Apr. 1. More significant, however, is the decrease of from 40 to 50 per cent. in stocks in the region about the Lakes, Wisconsin, Minnesota, Michigan, both upper and lower, Texas, Missouri and Ohio. The same decrease is reported from Georgia, Maryland and Oregon.

Decreases in stocks of from 30 to 40 per cent. are reported for New England and New York in the northeastern section of the country, in South Carolina, Kentucky, Illinois and Arkansas in the Southern and Central States, and in North Dakota. Decreases of from 20 to 30 per cent. are recorded in Pennsylvania, New Jersey, West Virginia, Indiana, Louisiana, Montana, Utah and Washington.

Virginia, North Carolina, Tennessee, Alabama, Florida in the south and Nebraska, Kansas, Oklahoma, Colorado, New Mexico and California in the western part of the United States report decreases in stocks of bituminous coal from 10 to 20 per cent. In Idaho and Oregon the quantity of bituminous coal in storage was not materially changed.

From Pennsylvania and Maryland in the east to Kansas and Nebraska in the west, and in the Mississippi Valley south to the Gulf, excluding the State of Mississippi, but including Florida, stocks in the hands of industrials are sufficient for from three to five weeks. New England reports from 11 to 15 weeks, except New Hampshire with 20 weeks, New York 9 weeks, New Jersey 8 weeks and Delaware 7 weeks. Stocks in the South Atlantic section range from 6 weeks supply in Virginia to 9 weeks in North Carolina, Georgia and South Carolina having 7 and 8 weeks respectively.

The lower peninsula of Michigan has 7 weeks supply, Wisconsin 6 weeks and Minnesota 10 weeks. West of the Mississippi stocks range from 3 weeks in Washington to 14 weeks in Oklahoma.

In about one-third of the states east of the Mississippi the stocks of steam coal in the hands of public utilities increased from Jan. 1 to Apr. 1. Georgia in the south, with an increase of 20 per cent., and Indiana, Kentucky, Ohio, West Virginia, Virginia, Maryland, Delaware and Pennsylvania in the central-eastern section, with increases in stocks ranging from 10 per cent. in Kentucky to 126 per cent. in Delaware, were the states reporting the increases. In the northeastern part of the country the decreases in New York and New England were small, from 3 to 20 per cent.; in the south the largest decrease was 44 per cent. in North Carolina. The largest decreases, more than 50 per cent., were in Wisconsin, Minnesota and South Dakota.

In the aggregate the stocks of bituminous coal held by public utilities decreased but 3 per cent., the decreases in some states having been offset by increases in others.

Coal for gas making in the hands of city gas plants decreased 16 per cent. in the three months ended Apr. 1. Increases in stocks of gas coal were reported in New Jersey, Pennsylvania, Maryland, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Indiana, Michigan and Washington.

Retail Dealers' Stocks of Coal

Stocks of anthracite in dealers' yards were greater on Apr. 1 than on Jan. 1 in four of the New England States, Maine, New Hampshire, Massachusetts and Rhode Island, also in Ohio, in all states south of the Ohio River and east of the Mississippi in Illinois, Iowa, Missouri and North Dakota. The only states east of the Mississippi to report decreased stocks of anthracite in dealers' yards are Vermont, Connecticut, New York, Pennsylvania, Maryland, Delaware, Indiana, Wisconsin and Minnesota. New Jersey and West Virginia report no change in quantity on hand.

Excepting only Alabama, Montana and Idaho, every state reported decreases in stocks of bituminous coal in dealers' yards. Notwithstanding this, the quantity of bituminous coal on hand Apr. 1 was equal to one-quarter the total sold and distributed in the three months preceding.

Stocks of bituminous coal held by plants engaged in the manufacture of iron and steel decreased 24 per cent. from Jan. 1 to Apr. 1. The largest decreases were in coal for use in byproduct coke ovens, 31 per cent. decrease in stocks of high-volatile and 33 per cent. in stocks of low-volatile. Gas-coal stocks decreased but 5 per cent. and steam-coal stocks 17 per cent. The stocks of high-volatile byproduct coal on Apr. 1 were sufficient for nearly three weeks' operation, those of low-volatile for four weeks Stocks of gas coal were sufficient for six weeks and of steam coal for seven weeks

Stocks of gas coal at steel plants in Pennsylvania were increased from January to April by 250 per cent., but in all other states were decreased. Excepting Alabama, stocks of steam coal were decreased in all states. New York, Pennsylvania, Michigan and West Virginia reported slight increases in stocks of high-volatile byproduct coal but decreases in low volatile; in other states reductions in storage of both grades of byproduct coal were the general rule.

The production of coke, both byproduct and beehive in January, February and March, 1919, is estimated at 12,738,700 net tons, an increase of 307,000 tons or 2.5 per cent. compared with the first quarter of 1918. Byproduct coal increased from 5,321,600 tons in the first quarter of 1918 to 6,779,500 tons in the first quarter of 1919, a gain of 27 per cent. Beehive coke recorded a decrease from 7,110,500 tons in the first quarter of 1918 to 5,959,100 tons the past quarter, a drop of 16 per cent. The transition from beehive to byproduct is indicated by the increase in the capacity of byproduct ovens completed, from 6,793,251 tons on Apr. 1, 1918, to 8,576,489 tons on Apr. 1, 1919, an increase of 26 per cent. Since April, 1918, production of byproduct coke has been begun in Colorado and in Rhode Island, and considerable increases in capacity have been made in Maryland, New York, Ohio, Pennsylvania, Tennessee, West Virginia, Wisconsin, Alabama, Illinois, Indiana and Kentucky.

The decrease in the production of beehive coke in the first quarter of 1919 compared with 1918 in Pennsylvania was 5 per cent., as against a decrease of 40 per cent. in all other states.

WEEKLY COAL PRODUCTION

The production of bituminous coal in the United States during the week ended Apr. 19 is estimated at 7,403,000 net tons, and is a decrease of 143,000 net tons compared with the output during the week ended Apr. 12, estimated at 7,546,000 net tons. During the same week of 1918 the operators of the country produced 11,044,000 net tons, and in comparison the current week's output is 3,641,000 net tons, or 33 per cent. lower. For the calendar year to date the output is now estimated at 128,389,000 net tons, as against 166,352,000 net tons during the corresponding period of last year, a decrease of 37,963,000 net tons. This tremendous falling off is better illustrated by comparison of the daily average production—1919 to date, 1,366,000 net tons, and for the same period of last year 1,770,000 net tons. During the current week the daily average is estimated at 1,234,000 net tons, showing that production is continually on the downward grade.

The production of anthracite in the United States during the week ended Apr. 19 is estimated at 1,568,000 net tons, as compared with 1,750,000 net tons during the week ended Apr. 12 and 1,870,000 net tons during the corresponding week of 1918. The daily average per working day during the current week is estimated at 261,000 net tons, as compared with 237,000 net tons for the calendar year to date and 312,000 net tons for the same period of 1918. The total production for the period Jan. 1 to Apr. 19 is estimated at 22,261,000 net tons, as against 29,304,000 net tons during the corresponding period of last year.

Bituminous coal shipped from tidewater harbors to all points during the week ended Apr. 19 is estimated at 405,117 net tons and falls behind the tonnage shipped during the week ended Apr. 12 by approximately 79,000 net tons. Shipments during the current week were but 50 per cent. of these in the corresponding week of last year, 800,312 net tons. A falling off occurred in the tonnage loaded at all the harbors during the current week, with Hampton Roads falling behind the most—40,000 net tons.

Shipments of bituminous coal to New England by tidewater during the week ended Apr. 19 are estimated at 79,491 net tons, as compared with 117,478 net tons during the week ended Apr. 12 and 232,458 net tons during the corresponding week of 1918. The decrease during the current week is due to a falling off in the tonnage loaded at both New York and Hampton Roads. In New York the decrease amounted to approximately 12,000 net tons, and Hampton Roads to 28,000 net tons.

The production of beehive coke in the United States during the week ended Apr. 19 is estimated at 394,912 net tons, and while but slightly less than the 318,630 net tons produced during the week ended Apr. 12, was approximately 200,000 net tons below the output of the corresponding week of 1918. Decreased production occurred in all states during the week of Apr. 19, and in Pennsylvania the current week's output was but slightly more than 50 per cent. of the production during the week of Apr. 20 of last year. All other coke-producing states are far behind the records of the spring of 1918, and for the calendar year to date the output in the United States is 1,900,000 net tons below the output of the same period of last year, recorded at 8,835,956 net tons. The daily average per working day during the current week is estimated at 49,152 net tons, as against 73,824 net tons for the period Apr. 1 to date.

The production of byproduct coke in January, February and March, 1919, was 5,321,600 net tons, an increase compared with the same period of 1918 of 1,457,800 tons, or 27 per cent. In the same periods the production of beehive coke decreased 16 per cent., the net result being an increase in total coke output of 306,500 tons, or 2.5 percent. In the year from Apr. 1, 1918, to Apr. 1, 1919, many new byproduct ovens were completed, the increase in capacity having been 26 per cent. Production of byproduct coke began in Colorado in July, 1918, and in Rhode Island in February, 1919. New ovens were completed in Maryland and New York, beginning in March, 1918; in Ohio the plant of the American Steel and Wire Co. began operation in May, 1918; the National Tube Co. at Lorain and the Ironton plant of the Solvay Co. began to produce in August, 1918; increases in capacity were made during the year at the Portsmouth plant of the Solvay Co., the Toledo Furnace Co. at Toledo, and the Youngstown Sheet and Tube Co. at Youngstown, Ohio. The plant of the Hamilton-Otto Coke Co. suspended about Feb. 1, 1919.

In Pennsylvania the Clairton plant of the Carnegie Steel Co. began operation in June, 1918, and the Steelton plant of the Bethlehem Steel Co. was enlarged. The plant at Chattanooga, Tenn., was enlarged, likewise the Follansbee, W. Va., plant of the La Belle Iron Works and the Benwood, W. Va., plant of the Solvay Co. Plants at Milwaukee and Mayville, Wis., were enlarged, the number of ovens at the Ensley, Ala., plant of the Solvay Co. was increased. Additions were also made at the plants of the Solvay Co. at South Chicago, the Gary, Ind., plant, the Indiana Harbor plant of the Inland Steel Co. and the Ashland, Ky., plant of the Solvay Company.

It is significant of changed conditions that the percentage of capacity attained in production was about the same in the first quarter of 1918 and 1919, but that the losses in 1918 were due to lack of coal and in 1919 to lack of market.

BUSINESS OPINIONS

Marshall Field & Co.—Current wholesale distribution of dry goods is running slightly less compared with the same week last year. Many merchants were in the market and all report a continuance of excellent retail business. The firm tendency of the market has stimulated road business and orders for both immediate and future delivery were in considerably larger volume than same period last year. Collections are satisfactory.

Dry Goods Economist—The labor situation is far from satisfactory. Some of the strikes that have threatened to interfere with the country's business have been called off. On the other hand, certain organizations of workers are presenting new demands which, unless modified bid fair to cause disruption of present producing plans, and prominent among these are the unions of coat and suit operatives in New York. Where strikes have been settled the shorter hours granted to the workers have resulted in curtailed output.

American Wool and Cotton Reporter—Prospects of prices for wool in the West seem to constitute the principal interest in the wool trade at present, other than that manifested in the wool auctions. It is reported that 50c. is being paid the grower for the higher grades of staple wools in Michigan. Prices which are paid in the West are high, compared with those paid at the auction for similar grades of wool. There is no special new feature in the cotton market at the present time, except that if anything it is in a more favorable position.

The Iron Age—The open market that has existed recently in steel products has not been generally recognized because it did not show widespread and sensational price cutting. The industry, without any concert, has been limiting operations to the business coming in. In the past week that has meant further shutting down of blast furnaces and curtailment of working time at steel works. Generally a 50 per cent. operation or somewhat less is indicated among independent companies. The Steel Corporation is on a 70 per cent. basis in the Chicago district and is nearer to 60 per cent. in Pittsburgh and the Valleys.

Atlantic Seaboard

BOSTON

No perceptible improvement. Prices all-rail and at tidewater unchanged. Railroads have not yet made purchases. Low prices rumored on inferior grades. Quality coals being firmly held, except for spot orders. Steamers attracted by high rates offshore. All-rail shippers optimistic. Hampton Roads factors have little business in sight. The few orders in the market are eagerly sought. Anthracite demand strong. Shipments very little better than in 1918. Retail trade brisk.

Bituminous—The past week has been without any notable development in steam coal. It is hard to find signs of improvement in a market such as we are now struggling through, but udoubtedly each week sees some progress made. Heavy accumulated stocks are gradually being worked down and there are still consumers who will be obliged to enter the market before many weeks for more or less comprehensive tonnages. The whole territory is being as closely canvassed as at any period in the trade, and the few buyers who seem interested are quickly made to feel that spot orders are highly prized.

Prices have lately shown almost no variation. For contract all-rail the higher grades are held right around $2.95 per net ton at the mines, but a large number of coals from the South Fork district in central Pennsylvania are being offered at $2.75 @ 2.85. On coal from the Fairmont district there has been a wide range of price, but most of the low figures quoted are because of the restricted outlet here for coals of that region. Except on the New Haven road all-rail rates are against them, and aside from locomotive fuel the demand is relatively small for high volatiles. At tidewater there has been no change in coastwise freights, and except for some oscillation as to f.o.b. mine prices the Pocahontas and New River shippers find their situation practically unaltered. Under the peculiar conditions that prevail this year they find their market closely confined to plants within a short radius of distributing points like Providence, Boston and Portland. Their on-car basis is so high that when the rail charge inland is added the differential in favor of all-rail coals is so pronounced that little room is left for argument.

Contrary to expectation, the last of April has arrived without any contracts of large tonnage being made by the railroads. In nearly every case the New England railroad buyers have invited bidders to revise their proposals, and as yet no action has been announced. It is understood that several shippers have not changed their bids, and it is doubtful whether the Government management has accomplished anything by these moves. The trade continues to be much interested in railroad fuel developments, for in this section of the country it almost seems as if these orders were about the only ones left to worry about. With these long-deferred purchases out of the way it is felt there would be more stability to the market, even if current demand is light.

Rumors of low prices submitted to the railroads have of course had their effect upon the spot market. Scattering sales have been made by middle houses at $2.25 per net ton, but such quotations are on coals that can be used with automatic stokers, and where the saving of 10@15 per cent. in price alone is a consideration. There is less low-priced coal offering over the New York piers than was the case a month ago, due doubtless to the costly experience of many of the smaller shippers during February and March.

The fancy coals, however, are being firmly held, especially for contract. A two to three day a week basis of mining leads some of the operators to make concessions for May and June delivery, but seldom is more than 15c. considered necessary. The higher grades are making inroads on Pocahontas and New River trade, and their worth is being demonstrated. Buyers who have long been consistent users of West Virginia smokeless coals are trying out several of the quality coals from Pennsylvania and the tonnage of the latter is going to show relatively a large increase.

Coastwise freights from Hampton Roads have apparently struck their level, at least for the present. The rates of $1@1.15 from New York to ports on Long Island Sound will have a strong tendency to keep barge freights from Norfolk on the present $2 range, while for steamers there are very attractive offers being made offshore. On a monthly basis charters to South America and elsewhere are such as to leave the present coastwise rate of $2 wholly in the shade. It is hard to say, therefore, what would be the state of things should there suddenly develop a demand in New England for the smokeless coals. The fact is, however, that the market here is not likely to be any broader than it is at present and offshore business will continue to absorb bottoms that were built for the New England coal trade.

Bituminous prices at wholesale are about as follows, f.o.b. mines and at loading ports, per gross or net ton as designated:

	Clearfields	Cambrias and Somersets
F.o.b. mines, net tons...	$2.15@$2.75	$2.80@$3.35
Philadelphia, gross tons.	4.20@ 4.90	5.00@ 5.40
New York, gross tons...	4.50@ 5.25	5.35@ 5.80
Alongside Boston (water coal), gross tons.....	6.10@ 6.85	6.90@ 7.65

Georges Creek is quoted at $3.20 f.o.b. mines per net ton.

Pocahontas and New River are unchanged at $4.69@5.14 f.o.b. Norfolk and Newport News, Va., both for spot coal and for contract. Alongside Boston the present gross ton range would be $6.85@7.50. Season prices have been made at $7.90 on cars, Boston, for inland delivery, but with few sales reported.

Anthracite—The demand for domestic sizes is very strong, with no indication of any easing up for months to come. All the shippers seem well supplied with orders, and for stove and chestnut especially there is an insistent call. The transfer of the Reading fleet of barges and tugs to Port Richmond, Philadelphia, has at last been accomplished, and it is very much hoped that all the delays that were incident to the movement of these barges from Port Reading are now things of the past. Retail dealers along the coast are now hopeful that this long-awaited move will speed up the movement, and that in May coal will come forward in much better volume. While April figures are not yet in hand, it is apparent that receipts here are little, if any, better than in April, 1918, although dealers have been able to secure better assorted cargoes.

From all directions reports are very favorable as to retail trade. The public seems ready to accept present prices, and dealers are being flooded with orders.

NEW YORK

Anthracite moving rapidly. There is much activity in all branches and dealers look for a busy season. All sizes bringing full prices, with some shippers asking slight premiums for some of the steam sizes. Bituminous situation unsettled, because of slow buying and belief that lower prices will prevail.. Anthracite domestic sizes advance 10c. per ton.

Anthracite—With the mines, in the main, operating nearly full time, many operators having sufficient orders ahead to carry them into June and the retail dealers delivering coal as fast as they receive it, the industry is doing nearly all that can be expected of it at this season of the year.

The present condition of the trade is almost the reverse of what it was a few weeks ago. At that time the dealers were doing almost nothing and expected a dull season for the early summer, to be followed by a rush. However, the public suddenly awoke to the fact that the producing companies were not going to make the usual spring reduction, but that in its place there would be a monthly increase of 10c. per ton for five months, which in itself will make the wholesale price of coal 50c. a ton more on Sept. 1 than it was during April. In addition there is likely to be a further increase due to the advance in wages given the harbor boatmen, which will have to be met by the retail trade so far as it affects coal deliveries.

The public is buying on a good basis, but not as heavy as it did a year ago, which is due to the mild winter. The weather conditions during April resulted in heavy consumption and there were many one- and two-ton orders. The dealers are hopeful that the public will take advantage of the present state of the industry and place its orders for next winter's supply early.

The trend of the improvement can be seen in the record of dumpings at the local docks during the week ended Apr. 25, 5288 cars having been dumped as compared with 4595 cars the previous week, an increase of 693 cars.

The ending of the strike of harbor boatmen caused a flurry in shipments for a few days, but conditions soon became normal. There has been an increase made in water freight rates and boat-owners are as a rule asking 50c. per ton for deliveries in the harbor limits.

Reports from inland dealers show that in this vicinity they are carrying smaller stocks than they had in the early part of January, while throughout New England conditions are just the reverse.

Inquiries from Canadian dealers are numerous. Supplies are badly wanted and orders are generally accompanied by a request that the coal be hurried forward.

The anthracite steam coal maket is gaining strength. Demand is heavy, and instead of an easy price situation some of the better grades of the so-called "independent" buckwheat coal are said to have been quoted at slight advances over the regular company schedule. Rice is in better demand than either buckwheat or barley.

Current quotations, white ash, per gross ton, at the mine and f.o.b. tidewater at the lower ports are as follows:

	Mine	Company Circular
Broken	$6.05	$7.90
Egg	5.95	7.80
Stove	6.20	8.05
Chestnut	6.30	8.15
Pea	4.90	6.65
Buckwheat	3.40	5.15
Rice	2.75	4.50
Barley	2.25	4.00

Bituminous—The market is unsteady due to the disposition of some buyers to delay stocking up. There is a belief among many buyers that there is going to be a drop in prices, and at any rate they are willing to take a chance on being able to pick up sufficient coal in the open market at lower than present prices to keep them supplied.

The settlement of the harbor strike did not improve delivery conditions to any extent. There was considerable congestion at the docks following the ending of the strike because of the apparent desire of every dealer to get his boat loaded first, with the result that there was more or less delay in getting boats loaded and then towed.

Bunker coals are in better demand than the commercial coals. Many ships come and go daily, and producers and shippers with a heavy bunkering business find themselves rushed with orders for immediate delivery. In many instances ships were loaded on Sunday, so strong was the demand for immediate coaling.

The lack of demand is attributed to the fullness of many consumers' bins, even though local shipments were slackened for several weeks. The local piers are well stocked with coal, due to the lifting of embargoes followed by increased shipments from the mines.

Stocks in the hands of consumers in the northeastern section of New York State are said to show a heavy reduction from the early part of January, but even at that it is estimated that the stocks on hand are sufficient to last for from 7 to 9 weeks. Much better reports come from New England, where large consumers are carrying heavier stocks.

There has been a slight decrease in quotations for loaded boats alongside, these ranging from $5.75 to $6.75 in some instances. Quotations covering the general range of coals show a slight decline for some grades, but they are small and of little consequence.

The report of dumpings of bituminous coal at this harbor for the week ended Apr. 25 shows an increase of 851 cars over the number for the previous week.

Quotations for the various grades of bituminous coal for spot delivery or on contract range about as follows:

	Spot	Contract
South Forks	$2.90 to $3.25	$2.95 to $3.50
Cambria County (good grades)	2.80 to 3.10	2.95 to 3.25
Clearfield County (good grades)	2.65 to 2.95	2.80 to 2.95
Reynoldsville	2.50 to 2.75	2.75 to 2.95
Quemahoming	2.75 to 2.95	2.95 to 3.10
Somerset County (best grades)	2.75 to 2.95	2.95 to 3.10
Somerset County (poorer grades)	2.25 to 2.50	2.50 to 2.75
Western Maryland	2.25 to 2.75	2.50 to 2.75
Fairmont	2.10 to 2.35	2.35 to 2.50
Latrobe	2.10 to 2.25	2.25 to 2.40
Greensburg	2.35 to 2.40	2.35 to 2.60
Westmoreland 2 in.	2.60 to 2.75	2.60 to 2.75
Westmoreland run-of-mine	2.35 to 2.60	2.35 to 2.65

PHILADELPHIA

Anthracite activity continues. Heavy orders booked by all shippers. Stove in greatest demand, with nut close second. Pea improves, but still plentiful and troublesome. Strong advertising campaign helps trade. Retail price situation fairly firm and improving. Steam sizes in fair shape only. Some shadings on the smaller sizes. Mine prices on family coal up 10c. Bituminous unimproved. Consumption light. Condition fair at tide. Rail price still in abeyance.

Anthracite—A continuation of the great activity that began two weeks ago is reported from the offices of all the big shippers. Several individual shippers report that they are booked for heavy tonnages two months in advance. It is a fact that no operation of any reputation seems to be lacking in orders for egg, stove and chestnut. From some of the larger shippers it is learned they are practically sold up for May, and that no new business is being taken except subject to a delay of at least thirty days.

All shippers report that many orders for stove, and quite a few for chestnut, will remain unfilled for April. Pea, too, is stronger, but it can still be shipped fairly promptly, and some of the smaller operators are said to be offering it at less than company price. It is believed also that a few of the individual shippers are insisting that their customers, for stove coal particularly, also take a certain quantity of pea.

It is quite apparent that the shippers are assuming a more cheerful attitude, particularly the large operators, and the good demand for coal is general throughout the country and it is becoming evident that good business will continue much later than anticipated during the dull days of March. The demand for family sizes continues unabated from the West where the consumers seem bent upon making up for the coal that was denied them last year.

Retail prices can be said to be held quite firmly, and the cutters have had no increase to their number. In fact a number of the lower-priced dealers are expected to advance their rates any day, especially as their stocks of pea coal run down and they begin purchasing at the new figure. It will be remembered that the principal drive of the cutters has been on this size, most of which was purchased at a lower figure than the new circular. All representative dealers continue to charge $10.30 for egg, $10.55 for stove, $10.65 for chestnut, and $9.05 for pea, per ton of 2240 pounds.

As business improves so do collections, and as the retailers are enjoying a fair margin at the above rates, the shippers are again growing more particular about extending credits.

With the larger sizes in such active demand, it is to be regretted the spurt has not as yet reached the steam trade. The big companies continue to store buckwheat; but it is the opinion of at least some of the shippers that industrial conditions are sure to improve before this size is produced in excess of the demand and the capacity of the storage yards. Certain it is there are bound to be very serious difficulties if the demand for egg, stove and nut keeps up, with no corresponding demand for pea and smaller sizes. As to prices some of the smaller shippers continue to offer buckwheat around $3, and we have heard of some sales as low as $2.85. Rice is actually reported by some shippers as stronger than buckwheat, but is still selling for $2.25 to $2.50. The latter is probably close to the average. No one reports barley except as being in less demand than either buckwheat or rice, and we are told that sales are recorded $1 per ton less than the circular, or $1.25.

As announced when the spring price circular was issued, the mines prices advanced 10c. per ton on May 1, making the prices per gross ton for line shipment and f.o.b. Port Richmond for tide as follows.

	Line	Tide		Line	Tide
Broken	$5.95	$7.80	Buckwheat	$3.40	$4.45
Egg	5.95	7.80	Rice	2.75	3.65
Stove	6.20	8.05	Boiler	2.50	3.50
Nut	6.30	8.15	Barley	2.25	3.15
Pea	4.90	6.50			

Bituminous—Practically no one in the trade is willing to admit that there is any real improvement in business. Production is off as compared to last year at this time, and few operations are working more than half their capacity. The market is simply unable to take any more than a moderate tonnage. While in ordinary years most plants were storing coal at this time, now most of them are anxious to reduce stocks on hand.

At tide there is a fair volume of business, but principally bunker trade. Even this is not as heavy as in the past, as the ships are gradually resuming the practice of bunkering only for one way instead of for a round trip as became the custom during the war. The coastwise trade remains quiet, with rates still high.

There has been no adjustment of the railway fuel controversy and it looks like a waiting game on both sides. The operators seem to have reached their limit in submitting prices to the railroads only to have them rejected.

Despite the rather inactive market, prices continue to rule fairly firm. The following are fairly representative of the figures ruling lately:

Georges Creek Big Vein	$3.00 @ $3.10
South Fork Miller Vein	2.90 @ 3.10
Clearfield (ordinary)	2.75 @ 2.90
Somerset (ordinary)	2.55 @ 2.70
Fairmont lump (ordinary)	2.40 @ 2.50
Fairmont mine-run	2.20 @ 2.35
Fairmont slack	2.05 @ 2.20

BALTIMORE

Market slowly settling into more normal condition. Inquiries increasing. Hard-coal schedule for April to be continued through May for retail purchasers. The export situation.

Bituminous—The government departments, including the Railroad Administration, are now seeking contracts on both yearly and monthly deliveries. A number of the larger industries in this and nearby sections are also sending out contract inquiries, and the general situation as to soft coal seems to be shaking down to normal. More contracts are being made now, and there is a growing inclination to get under cover.

For best grade coals the contract prices are still being held firm at the old Government maximum rates, or better; for the less desirable coals there is more of an inclination to shade, and some of those who had announced that they would not let go of their product below the Government schedule are now making contracts to supply customers at from 25c. to 50c. off the figures they first set. This inducement is bringing consumers under cover where they held out when the spot prices benefit was probably double that of the latest cuts on contracts. Within a few weeks it is predicted that the spot prices will have come up about level of the present contract prices, and that many more contracts will be recorded.

The trade believes that later in the summer both the spot and contract prices will be decidedly higher than the offerings to consumers at present. The export movement the past week was but fair, dropping considerably behind the week previous. There was exported in four bottoms a total of 12,840 tons of cargo bituminous; 908 tons for bunker use, and 90 tons of anthracite for cargo.

Anthracite—Announcement is made here that the April schedule for hard coal at retail, which was 40c. off the last winter prices, in addition to an allowance of 25c. per ton for cash within ten days of delivery, is to be continued throughout May. The same schedule may be held until July 1, if there is no freight rate or other unexpected increase. The retail trade is taking orders at the existing price where consumers tell them bins are ready for coal at once; and at the price at time of delivery if the order is placed now subject to later notice as to delivery. The supplies here were not enough to meet the rush of orders that followed the April price cut, and the dealers expect to be pretty busy all through May.

Lake Markets

PITTSBURGH

Sentiment somewhat improved. Reduction in stocks. Decreasing consumption by steel industry.

Sentiment as to market prospects is much improved in Pittsburgh coal-producing circles. While there has been but little improvement in actual demand, there is progressive diminution in stocks in the hands of consumers, and the heavy part of the lake shipping season is neared by another week. In connection with stocks, there has been considerable discussion of the Fuel Administration's statement as to reduction in stocks during the first quarter of the year. Stocks of bituminous coal in the hands of industrial concerns, the iron and steel industry and gas and electric public utilities, decreased by 25 per cent. or by 8,000,000 tons.

Such a statement may be regarded as favorable or unfavorable according to the viewpoint. If the objective were the elimination of such stocks, little progress was made if the reduction in three months, winter months at that, was only 25 per cent. On the other hand, however, it is pointed out in the trade that practically all these consumers carry stocks, and the iron and steel industry, when facing a period of activity, particularly in the fall, counts upon having large stocks.

A feature of the situation encouraging to operators is the manner in which prices are being maintained. Such shading as occurs is confined almost entirely to spot lots or short term deliveries, say to July 1 at the outside. Even spot lots do not evince much softness. Steam coal has sold down to $2 of $1.90, but only in special cases, and many of these are of operators who but recently entered the ranks of producers and for financial reasons must maintain production.

The steel industry's coal consumption is decreasing, with lighter steel production each week. The leading independent in the Pittsburgh district is operating at only 45 per cent., while the independents in the Youngstown district are running 50 to 65 per cent. The Steel Corporation subsidiaries in the two districts are operating at 65 to 70 per cent. The tin plate industry, a large coal consumer in proportion to its tonnage output, is doing only about 55 per cent., but will probably be running full in the summer.

There is a little more activity in byproduct coal. Sales running from spot to deliveries over a few weeks have been made at down to $2.10, but it is doubted whether $2.35 could be shaded materially on a year contract. Disregarding occasional cut-price transactions the market is quotable as follows: Byproduct, largely nominal, mine-run, $2.35; high-grade gas coal, slack, $2.10@2.20; mine-run, $2.35; ¾-in., $2.50@2.60; 1¼-in., $2.60@2.70; steam, slack, $1.90@2; mine-run, $2@2.35, all per net ton at mine, Pittsburgh district.

TORONTO

Dealers very busy. Domestic consumers rushing orders before price goes up. Stocks in yards light. Fears of a coal famine next winter. "Coal Club" cannot buy at wholesale prices. Bituminous still quiet.

Dealers are very busy, as the consumers of anthracite, who have for some time been withholding orders in the vain expectation of some reduction in price, are now buying freely. A touch of chilly weather, combined with the prospect of an increase

in price, has stimulated the movement; and something like a rush has set in. Stocks in the yards are low and shipments from the mines comparatively light since the setting in of navigation, much of the supply being diverted to the upper lakes

H. A. Harrington, Deputy Fuel Controller for Ontario, has issued a warning to the public that the province may expect a coal famine next fall and winter unless people lay in their supplies at once. He further gives figures to show that not only will consumers have difficulty in getting coal, but that the price next fall will go up to about $14 per ton, as at present there is an actual shortage of coal. A number of citizens organized a "Coal Club" with the object of buying their coal for the winter in carload lots at wholesale prices in Buffalo, paying their own freight and haulage charges here. Their representative visited Buffalo and interviewed the dealers who refused to sell to him, saying that they had agents in Toronto and would not deal with private individuals.

The demand for bituminous continues light, as there is little change in the industrial situation with a slight reduction in wholesale prices.

Quotations for short tons are as follows:

Retail:	
Anthracite egg, stove, nut and grate	$11.50
Pea	10.00
Bituminous steam	8.25
Slack	7.25
Domestic lump	10.00
Cannel	11.50
Wholesale f.o.b. cars at destination:	
Three-quarter lump	6.00
Slack	4.75@5.00

BUFFALO

Bituminous decidedly quiet. Car shortage in grain trade looks ominous. Settling the freight prepayment demand. Anthracite moving steadily.

Bituminous—The surplus of slack still vexes the market. This condition was not unexpected, as it happens regularly when the lake trade opens; but now it comes at a time when the trade is staggering under the load of over-production and adds another strain to the market.

A sudden shortage of cars in the grain trade is attracting attention, as it is something that might easily happen in the coal trade; and when it does the market will stiffen rapidly. Jobbers have warned consumers that something of the sort is about due, but no attention is paid to their statements.

The railroads are fixing up the new rule obliging the prepayment of the freight on slack coal going into Canada. A meeting has been held at the office of the Michigan Central R.R., which was attended by coal shippers. The plan is to establish some regular guaranty or insist on full prepayment.

Bituminous prices are not very strong, but figures are the same as last week: $4.65 for Allegheny Valley, except slack; $4.45 for Pittsburgh and No. 8 lump; $4.20 for mine-run, same, and $3.80 for all slack, per net ton, f.o.b. Buffalo.

Anthracite—The movement is good. Some shipping agents are behind with their orders for Canadian and rail shipment west, and the supply for lake loading has been cut down materially. The consumer does not want to pay the advance in price and the demand is said to be heavy eastward. If the Canadian retailers were not handicapped with substitute fuel there would be quite a rush for anthracite there.

Lake clearances for the week are 48,000 net tons to Duluth and Superior, 31,700 tons to Milwaukee, 13,574 tons to Sheboygan, 11,947 tons to Fort William and 6600 tons to Chicago. Freight rates are 42½c. to Duluth and Fort William, 50c. to Milwaukee and Sheboygan, 60c. to Chicago.

CLEVELAND

Activity in the lake trade has completely overshadowed the local steam-coal market. Strong in the belief that bituminous coal will be scarce later, operators are crowding shipments forward. Pocahontas has been marked up 25c. by all dealers and 50c. by some. Present prices are believed to be plumbing bottom for this spring.

Bituminous—No. 8 mine-run is to be had here in any tonnage at $2, No. 8 three-quarter inch at $2.10 and slack all the way up from $1.75. But even these attractive prices—attractive, comparatively—are not stimulating business. Nor are No. 8 district operators putting forth very strenuous efforts to sell, for the lake trade is making heavy inroads into production. Generally speaking, the upper-lake dock coal interests stand ready now to take all the bituminous coal operators can forward. While many lake shipments are going forward with the price to be determined later, this business looks alluring to both operators and the dock interests, and the arrangement is mutually satisfactory.

Without exception, all dealers have pushed Pocahontas prices up 25c. a ton, while a few of the larger ones have made the advance 50c. Dealers complain that offers of $3.50 for Pocahontas are spurned, whereas $2.60 before and $2.95 during the war were the market levels. Difficulty of disposing of the slack is making the coarser grades of Pocahontas higher, it is said. Dealers are warning consumers to lay in next winter's supply, and quite fair results are reported. Anthracite is somewhat difficult to move despite the certainty of a 10c. increase May 1 and further advances throughout the summer.

Many No. 8 district mines are reporting labor shortages, a condition just the reverse of that obtaining in eastern Ohio not more than five weeks ago. Belief that the coming summer will see mines operating at close to 100 per cent. is gaining ground. Mine workers who were growing restive have neither the time nor the inclination now, and indeed not the audience, for their dissensions. With the resumption of activity the labor situation has improved greatly.

Lake Trade—Authoritative carrying rates for coal on the Great Lakes this summer finally have been determined. The rate from Lake Erie ports to the head of the lakes—Superior and Duluth—will be 42½c. a ton, compared with 48c. last season. This was the first price arrived at. But instead of a rate of 50c. to Lake Michigan, coal from Lake Erie will be charged 47½c., as against 55c. in the season of 1918. The big lake fuel interests have announced this season's fuel coal will cost $4.35 from car dumpers and $4.85 from lighters, both prices applying at Ohio ports. The charge in the Detroit River and at Lime Island will be $5.50.

Not only do the lake coal interests believe that coal will be scarcer later in the summer, but that cargo space also will be more difficult to get. The iron ore trade is opening up quite slowly, and the end of the season is likely to find ore carriers rushed back to the head of the lakes light. No contracting below $2.35 is reported, with $2.40 still being held up as nearer the correct figure.

DETROIT

Lack of interest among Detroit buyers causes jobbers to fear their efforts to get bituminous coal later may be hindered by shortage of supply.

Bituminous—While a small amount of encouragement is derived by Detroit jobbers and wholesalers from reports that several of the large users of steam coal are cutting down their reserves more rapidly than a few weeks ago, there seems little tangible present improvement in the market. The larger proportion of buyers is exhibiting no interest. A few scattering inquiries appear, but these come principally from the smaller buyers.

Jobbers say that the Fuel Administration prices are being quoted to inquirers considering contract negotiations. These prices also are said to be generally maintained on sales of lump and prepared sizes. Mine-run and slack are proving more difficult to place, and the Government prices have been shaded materially in a number of instances, the reduction on slack amounting to as much as $1 a ton. Price reductions, however, do not seem to stimulate buying. It is the contention of some of the jobbers that the buyers do not so much desire cheaper coal as they do the assurance of stability of prices, to guard against some of their competitors gaining an advantage by placing orders at some later time.

Anthracite—Diligent attempts are being made by Detroit retailers to stimulate an early buying campaign among household consumers. The movement is supported by advertisements placed by the Detroit Coal Exchange. The supply of anthracite now seems plentiful, and buyers are warned that the prices on prepared sizes will be advanced May 1.

COLUMBUS

A slight improvement is noted in the Ohio coal trade. There is a better feeling in steam circles, although the larger purchasers are still holding off on contracts, because of price uncertainty. The lake trade is showing signs of starting.

The steam trade in Ohio territory is more active as a result of some orders and a greater number of inquiries. Though a majority of the larger consumers are still waiting to see the outcome of price developments, some of the smaller users are buying considerable for current needs. The demand for spot shipments is slightly better, and this is reflected on the entire trade. The railroad situation is still unsettled and little railroad contracting is reported. Producers are only mining what their orders call for, and consequently there is practically no overproduction. The worst feature is the slowness of industrial conditions to improve, and consequently there is no increase in fuel requisitions.

The lake situation is slow in clearing up as it is connected with the steam situation so closely. Lake prices are still unsettled, and as a result there is little contracting for lake tonnage. Some agreements have been entered into leaving the price question to be settled at a later date. Some vessels are being loaded and a small movement will start about May 1.

The domestic trade is quiet, and this is one of the drawbacks to the market. There is a good demand for the better grades, such as Pocahontas and splints, but the usual run of domestic tonnage is not moving. Retailers have sufficient stocks for the present and they are waiting, like steam users, to see the price question settled. Little domestic tonnage is moving from Ohio mines. Retailers are urging the public to buy early, but their campaign is not meeting with results.

CINCINNATI

..No activity in market at present. All hopes based on future. Board of Education asks for bids on coal.

Leaders in the coal industry here are anticipating a tremendous business boom following three or four months of readjustment, and are making such arrangements as are possible under the unfortunate conditions existing to furnish a greatly increased demand which, coming with a rush as it is expected to do, will in all probability cause a serious coal shortage and consequently higher prices. Wages of the coal miners are very high, and are not expected to be adjusted until peace has finally been declared, when there is more likely to be an increase rather than a reduction.

The Board of Education of Cincinnati will receive bids for coal of the following description: 10,000 tons more or less smokeless run-of-mine coal; 4500 tons more or less nut and slack bituminous coal; 2500 tons more or less lump bituminous coal; 75 tons more or less run-of-mine (bituminous) coal. The specifications for this large contract are on file at the Chief Engineer's Office, at 511 Court St., Cincinnati, Ohio. Each proposal must contain the name of every person interested therein, and must be accompanied by surety company's bond in an amount equal to 30 per cent. of the amount of the bid, as a guarantee that the bid is bona fide, and the bond of the successful bidder or bidders approved and held until final settlement is made. The Board of Education reserves the right to reject any part of any or all bids.

LOUISVILLE

Conditions in the mining regions about the same. Retailers of Louisville reduce prices in order to increase summer stocking. General demand quiet.

The principal feature of the market in Louisville is the action taken by the Louisville retailers following a get-together meeting at the Board of Trade on Apr. 21, when it was decided to reduce May prices in order to stimulate spring and summer stocking. Reductions averaged from 30 to 60c. a ton retail. The retailers adopted the following prices:

	Eastern Kentucky	Smokeless	Western Kentucky
Block and egg	$6.50	$7.50	$5.60
Mine-run	6.25	7.25	5.35
Nut and slack	6.00	7.00	5.10

Anthracite, which is not handled to any extent on this market, was placed on a basis of $12.50 a ton. Eastern Kentucky coal included Harlan, Hazard, Jellico, Straight Creek, Elkhorn, West Virginia river or rail, and all of the high grades from the Cumberland mountain district. On a lump basis Harlan had been selling at $6.75; Jellico and Straight Creek, $7.10; Hazard, $6.65, and western Kentucky, $5.90.

While some objection was raised to the decrease in view of the fact that the mines are making no reductions, still it was believed that it would be much better to get the consumers started on summer stocking, even at a reduction in values, and objections were quickly overruled. However, in the few days since the new prices were announced there has been no material im-

provement in retail demand; but this may be due to the fact that it is near the end of the month.

Mines are holding prices firmly. The mines of the Jellico district are asking $3.25 for block and egg at mine, although some are selling on the same basis as other eastern Kentucky coals. The average range of prices are as follows.

	Eastern Kentucky	Western Kentucky
Block and egg	$2.85@$3.00	$2.60
Run-of-mine	2.30@ 2.50	2.35
Nut and slack	1.90@ 2.10	2.05

While western Kentucky is not doing much price cutting, and is endeavoring to hold prices firmly, a number of the mines are meeting eastern Kentucky competition openly. Some of the eastern Kentucky mines have been slashing prices considerably on mine-run and nut and slack. Most of the mine-run cutting has been done on low grades of badly mined coal, while on nut and slack many mines have been selling at low figures in order to unload it. There has been some spot coal from all of the fields on the market at low prices, but as a whole there has been less price cutting done than had been anticipated.

BIRMINGHAM

Good undertone apparently pervades the market, but material improvement in the steam trade is not noticeable. Domestic contracts have absorbed the anticipated output of many of the operations producing the best grades through March, 1920. Production from commercial mines slightly improves while furnace companies reduce their output.

While there is no noticeable improvement in the steam trade, basic conditions are favorable to a strong demand when the tide does turn, is the way in which well posted coal men sum up the local situation. Prices are reported as firm on the basis of the last Government schedule.

Domestic coal is in strong demand and there is need for every lump that is being produced. Some mines have sold their estimated output through March, 1920; that is, the better grades of fuel, while some companies are not selling to their anticipated capacity. Carbon Hill and Corona, cheaper grades, are also being eagerly sought and a heavy tonnage has been sold. Sales are based on a price increase of 10c. per ton per month through September added to the schedules effective Apr. 1.

Commercial companies are operating on about the same basis as they have been for several weeks past, but furnace companies have closed down many of their largest mines, as iron production is cut down to almost the lowest possible notch.

Coke

CONNELLSVILLE

Market fairly steady. Production better adjusted to consumption. Byproduct coal offered.

There is rather stubborn resistance to further price declines in Connellsville coke. The program of curtailing coke production to fit the circumstances is working out better than a few weeks ago, when operators could not keep track of furnaces about to blow out. Furnaces are still blowing out, but the notice is not so sudden. Conditions are also helped by the exhaustion of stocks at most furnaces and shipments are more regular in proportion to actual consumption.

Many of the coke operators would like to sell coal for by-product purposes, but the opportunities are limited. The regular asking price is $2.35, but many operators would be willing to shade this price by 10 or 15c., in some cases by 25c. In the case of operators with the lightest production it is not a case of choosing which is more profitable, to sell coal or to sell coke, because most operators consider it essential to maintain organizations. Even at $2.10 for coal, the value of the coal for a ton of coke would be $3.15, and when coke is sold at $3.60 there is represented a margin of only 45c., and even with $2.75 coke the 60c. margin is not sufficient to cover the cost of coking. Sales of coke at such prices are made only for special reasons. Operators with a fair rate of operation would not sell at under $4 or $4.25.

Spot and prompt lots of furnace coke have been going at $3.60 to $3.75, the latter being rather a high price on such business, commanded only by the best brands. Brokers assert that they could buy fair grade at $3.50 if they had definite orders to offer, and it is stated that bids at this price have been solicited by a few operators. The regular value, as an adjustment price under contracts, is held to be $4 to $4.25. Foundry coke has softened, ordinary brands that were commanding $4.50 in carload lots now being available at $4.25. One maker of a well-known brand has reduced from $5.25 to $4.75, but some are still holding to $6, in order to protect contract shipments. The spot and prompt market generally is quotable at $3.60@3.75 for furnace and at $4.25@6 for foundry, per net ton at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended Apr. 19 at 148,825 tons, a decrease of 1590 tons.

Middle Western

GENERAL REVIEW

Situation shows improvement. Export of large tonnage of Eastern coal will benefit Illinois and Indiana mines.

The situation in the Middle West market for the past week shows more improvement, and it is being freely predicted that within the next sixty days conditions will become normal, or perhaps a little better than normal. Mines are working more and are recovering slowly from the inactive period they were faced with two or three weeks ago.

News from the East is very encouraging, especially the news to the effect that the Government is going to get behind the exportation of coal, and do all possible toward opening up a market for our eastern coals in Europe, South America and North Africa.

The buying public are becoming more alive to the coal situation, and there has been a decided tendency, within the past two weeks, toward placing contracts. Some steam coal has been moving on the open market, and we understand at very fair prices.

CHICAGO

Activity in shipments and contracts. Domestic movement slowing up, with exception of coal from the East.

There has been some activity in the Chicago market, both on current shipments and on contract. The big news of the week is that the Universal Portland Cement Co., of Gary, Ind., has closed its contract with one of the big operators down in Franklin County. This business heretofore has been handled through the Consumers' company, but this year the Universal people decided to deal direct with the producer. This contract, which has just been closed, is one of and may be taken as a fair indication of the general attitude of the purchasing agents in Chicago.

The domestic situation is lagging a bit, with the exception of the movement of Eastern coals. The dealers believe that if they wish an Eastern coal, they had better purchase it now, and for this reason there is a brisk demand for all Eastern coals, while the demand for Illinois and Indiana coals is dull in the extreme. The Illinois and Indiana mines will come into their market a little later, along about July 15 and after.

MILWAUKEE

Business continues quiet, with everybody waiting for the promised new schedule of prices. First cargoes of the season being unloaded at the docks.

The coal market at Milwaukee has reached a waiting stage. Dealers announce that a new schedule of prices is due May 1 and consumers are holding off till that time. Naturally business is at a standstill. Some dealers think that anthracite will be shaded slightly at the opening, but that the monthly advance of 10c. per ton until September will carry the winter rate to a higher point than that which prevailed in the fall last year. Others hold that anthracite will open higher than present prices. It is hard to comprehend how bituminous coal can be stiffened any, as stocks on hand are fairly liberal and new consignments are arriving. Four good-sized cargoes have reached port since Apr. 20, and daily arrivals can be expected from now on. Coke is held at top figures, but stock piles are increasing.

ST. LOUIS

Nothing unusual to change the aspect of the local situation. Practically no contracts being signed up or arranged for, and an exceptionally small tonnage moving on all kinds of business.

The situation in the St. Louis territory continues exceedingly quiet. This is usually the season of contracting, but up to the present few contracts have been made for either carload or wagonload coal in St. Louis.

The local demand is extremely easy. There is a little coal of the cheaper grades for domestic business in small lots. It is so small, however, that it has no effect on the market.

In a steam way, the market is much quieter than is usual in this season. Manufacturing seems to be almost at a standstill judging from the condition of the screening market, which ordinarily would cause an unusual demand for screenings at this time. It is true that screenings are in good demand right now, but not to the extent that it has brought about any marked change in the price. This pertains to all fields.

There is a little anthracite moving for domestic storage and a little coke, but nothing in the way of smokeless or Arkansas.

Some mines are working a day or two a week and others are idle. The movement of coal as far as transportation is concerned is good. There are plenty of empties.

In a general way the districts are not any worse than is to be expected in view of the business situation all over the country.

Coal and Coke Securities

New York Stock Exchange Closing Quotations Apr. 28, 1919

STOCKS	Ticker Abvn.	Bid	Asked
American Coal Co. of Allegheny	(ACL)	45	....
Burns Brothers, Com	(BB)	161½	163
Burns Brothers, Pfd	(BB)	110	115
Central Coal & Coke, Com	(CK)	55	....
Central Coal & Coke, Pfd	(CK)	63	....
Colorado Fuel & Iron, Com	(CF)	43	43½
Colorado Fuel & Iron, Pfd	(CF)	105	125
Consolidation Coal of Maryland	(CGM)	75	....
Elk Horn Coal, Com	(EH)	27½	28
Elk Horn Coal, Pfd	(EH)	....	47
Island Creek Coal, Com	(ICR)	99	....
Island Creek Coal, Pfd	(ICR)	75	....
Jefferson & Clearfield Coal & Iron, Pfd	(JF)	60	....
New Central Coal of West Va	(NCC)	5	....
Pittsburgh Coal, Com	(PC)	50½	50½
Pittsburgh Coal, Pfd	(PC)	86½	87
Pond Creek Coal	(PD)	14½	15
Virginia Iron, Coal & Coke	(VK)	57½	59

* Ex. Div.

BONDS	Bid	Asked
Cahaba Coal, 1st Gtd. 6s, 1922	90	....
Clearfield Bituminous Coal, 1st 4s, Ser. A, 1940	71	....
Colorado Fuel & Iron, Gen. 5s, 1943	89½	91
Colorado Indus. 1st Mtg. & Col. Tr. 5s, 1934	74	74½
Consolidation Coal of Maryland, 1st Ref. 5s, 1950	87	91
Lehigh Valley Coal, 1st Gtd. 5s, 1933	98	101
Lehigh Valley Coal, Gtd. Int. Red. to 4%, 1933	98½	....
Lehigh Val. Coal & Nav. Con. S. F., 4½s, Ser. A, 1954	97¼	....
Pleasant Valley Coal, 1st S. F. 5s, 1928	90	....
Pocahontas Coal & Coke, Joint 4s, 1941	70½	85
Pocahontas Con. Collieries, 1st S. F. 5s, 1957	83¼	88
Roch. & Pitts. Coal & Ir., Helvetia Pur. Money 5s, 1946	87½	....
St. L., Rocky Mnt. & Pac. Stamped 5s, 1955	98	83
Tenn. Coal, Iron & R.R., Gen. 5s, 1951	80	95½
Utah Fuel, 1st Sinking Fund 5s, 1931	92	....
Victor Fuel, 1st Mtg. Sinking Fund 5s, 1953	87	70
Virginia Iron, Coal & Coke 1st 5s, 1949	55	....
	85	85½